

**“ASSESSMENT OF ORAL HEALTH STATUS AND EFFECTIVENESS
OF AN ORAL HEALTH EDUCATION PROGRAM IN 5- 15 YEARS
OLD HEARING IMPAIRED SPECIAL CHILDREN- AN
INTERVENTIONAL STUDY, MADURAI”**

A Dissertation Submitted in

Partial fulfillment of the requirements

For the degree of

MASTER OF DENTAL SURGERY (M.D.S)

BRANCH – VII

PUBLIC HEALTH DENTISTRY



THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

CHENNAI-600 032

2016 - 2019

DECLARATION BY THE CANDIDATE



I hereby declare that Dr. P. PREMKUMAR Post Graduate Student (2016-2019) in the

I hereby declare that this research entitled **“ASSESSMENT OF ORAL HEALTH STATUS AND EFFECTIVENESS OF AN ORAL HEALTH EDUCATION PROGRAM IN 5- 15 YEARS OLD HEARING IMPAIRED SPECIAL CHILDREN- AN INTERVENTIONAL STUDY, MADURAI.”** is a bonafide and genuine research work done by me under the guidance of **Dr. UMESH .K, M.D.S.,** Professor, Department of Public Health Dentistry, Best Dental Science College, Madurai.

DATE: 19.01.2019

PLACE: MADURAI

Signature of Dr. P. Premkumar
signature of the candidate

Dr. P. PREMKUMAR

Department of Public Health Dentistry,
Best Dental Science College,
PROFESSOR & H.O.D.,
MADURAI-625104 DEPT OF PUBLIC HEALTH
DENTISTRY

CERTIFICATE BY THE GUIDE



This is to certify that **Dr. P. PREMKUMAR** Post Graduate Student (2016-2019) in the Department of Public Health Dentistry, Best Dental Science college, Madurai- 625104 has done this dissertation work entitled **“ASSESSMENT OF ORAL HEALTH STATUS AND EFFECTIVENESS OF AN ORAL HEALTH EDUCATION PROGRAM IN 5- 15 YEARS OLD HEARING IMPAIRED SPECIAL CHILDREN- AN INTERVENTIONAL STUDY, MADURAI”** under my direct guidance and supervision in partial fulfilment of the regulation laid down by the Tamil Nadu Dr. M. G. R medical university Chennai- 600032, for M.D.S in Department of Public Health Dentistry degree examination.

Signature of the Guide

Dr. UMESH .K, M. D. S.,

Professor,

Department of Public Health Dentistry,

Best Dental Science College,

Madurai- 625104

Date: 19.01.2019.

Place: Madurai

PROFESSOR & H.O.D.,
DEPT. OF PUBLIC HEALTH
DENTISTRY,
BEST DENTAL SCIENCE COLLEGE,
MADURAI-625104.

**ENDORSEMENT BY HEAD OF THE DEPARTMENT AND
PRINCIPAL/ HEAD OF THE INSTITUTION**



This is to certify that the dissertation titled “ASSESSMENT OF ORAL HEALTH STATUS AND EFFECTIVENESS OF AN ORAL HEALTH EDUCATION PROGRAM IN 5- 15 YEARS OLD HEARING IMPAIRED SPECIAL CHILDREN- AN INTERVENTIONAL STUDY, MADURAI” bonafied research work done by **Dr. P. PREMKUMAR** Post Graduate Student (2016- 2019) in the Department of Public Health Dentistry under the guidance of, **Dr. UMESH .K, M. D. S., Professor and Guide,** Department of Public health Dentistry, Best Dental Science College, Madurai- 6251004.

Signature of the Guide

Dr. UMESH .K, M. D. S.,
Professor and Head of the Department,
Department of Public Health Dentistry,
Best Dental Science College,

Madurai- 625104

PROFESSOR & H.O.D.,
DEPT. OF PUBLIC HEALTH
DENTISTRY,
BEST DENTAL SCIENCE COLLEGE,
MADURAI-625104.

Signature of the Principal

Dr. K. S. PREMKUMAR, M. D. S.,
Principal,
Best Dental Science College,
Madurai- 625104

PRINCIPAL
BEST DENTAL SCIENCE COLLEGE
MADURAI-625104

Acknowledgement

The writing of this dissertation has been one of the most significant academic challenges I have ever had to face. Without the support, patience and guidance of the following people, this study would not have been completed on time. It is to them that I owe my deepest gratitude.

First and foremost, my praises and thanks are hailed to the God, the Almighty, for His showers of blessings throughout my research work to complete the research successfully.

I would like to thank our honorable Chairman *Prof. Dr.K.R.Arumugam* and our vice-Chairman *Prof.Dr.A.Babu Thandapani* for their valuable guidance and support throughout this research “The fruitful work of a teacher will be etched in a student’s life; beyond the sands of time”. I offer my sincere thanks to the Principal *Dr. Prem Kumar. K.S. M.D.S*, Best Dental Science College, Madurai for their assistance as ethical committee heads and for their consistent guidance and unwavering support throughout this project.

With deep reverence and gratitude, I would like to express my deep and sincere gratitude to my Teacher and research Guide, *Dr. Umesh. K. M.D.S*, Reader, Department of Public Health Dentistry, for giving me the opportunity to do this research and providing invaluable guidance throughout this research. He has taught me the right path to carry out the research and to present the research works as clearly as possible. It was a great privilege and honor to work and study under his guidance I very humbly acknowledge the encouragement, support and good will lent by my esteemed Head of the Department under whose leadership I feel privileged to do my post graduation.

I am indebted to my teachers *Dr.Muthukaruppaiah. R M.D.S.*, Reader and *Dr. Sangeeta chauvan. M.D.S.*, Reader , for their constant guidance, patient understanding and strong support throughout this research.I thank *Dr.Palanivel Pandian M.D.S*, Senior Lecturer, for his precious time, thoughtful ideas and valuable inputs.

Acknowledgement

I Sincerely express my gratitude from the core of my heart to all the participants and written consents with full patience. I am also grateful to the teaching and non-teaching staffs of the Institutions for their patience and support in overcoming numerous obstacles during the research.

I wish to gratefully acknowledge the value and help of my Seniors Dr. Dhivya. S. R. and Dr. Prathap. R., my batch mates Dr. Dheepthasri. S and Dr. Vidhya. G and my juniors Dr. Abinaya, Dr. Shrimathi. S, Dr. Lavanya Rahavi. S for their constant support.

Lastly, I would like to thank my family for all their love and encouragement. For my parents Mr. Prabhakaran. P and Mrs. Packiyalakshmi. P who raised me with love and supported me in all my pursuits. I thank my wife Dr. Uthra. N for all her love, support, help and encouragement. I must make a special mention of my lovable daughter Dhakshitha. P. U for her love and support.

Finally, my thanks go to all the people who have supported me to complete the research work directly or indirectly.

CERTIFICATE II

Urkund Analysis Result

Analysed Document: premkumar.docx (D46422753)
Submitted: 1/4/2019 3:45:00 PM
Submitted By: uthraprem55@gmail.com
Significance: 3 %

Sources included in the report:

<http://www.jioh.org/article.asp?issn=0976-7428;year=2018;volume=10;issue=6;spage=283;epage=286;aulast=Shivakumar>
<http://docplayer.net/102498252-Oral-health-conditions-and-behaviors-among-hearing-impaired-and-normal-hearing-college-students-at-ratchasuda-college-nakhon-pathom-thailand.html>

Instances where selected sources appear:

[Signature]
Guide & Supervisor sign with Seal
PROFESSOR & H.O.D.
DEPT OF PUBLIC HEALTH
DENTAL SCI
DENTAL SCIENCE COLLEGE
RACHASUDA

CERTIFICATE- II

This is to certify that this dissertation work titled **“ASSESSMENT OF ORAL HEALTH STATUS AND EFFECTIVENESS OF AN ORAL HEALTH EDUCATION PROGRAM IN 5- 15 YEARS OLD HEARING IMPAIRED SPECIAL CHILDREN- AN INTERVENTIONAL STUDY, MADURAI”**. Of the candidate **P. PREMKUMAR** with registration Number 241623152 for the award of **MASTER OF DENTAL SURGERY** in the branch of **BRANCH VII-PUBLIC HEALTH DENTISTRY**. I personally verified he urkund.com website for the purpose of plagiarism check. I found that the uploaded thesis file contains result shows three percentage of plagiarism in the dissertation.

HEAD OF THE DEPARTMENT

Dr. UMESHK M.D.S.

Guide & Supervisor sign with Seal
PROFESSOR & H.O.D.,
DEPT. OF PUBLIC HEALTH
DENTISTRY,
BEST DENTAL SCIENCE COLLEGE,
MADURAI-625104.

HOD

Dr. UMESHK M.D.S.

Professor,

Department of

Public Health Dentistry

PROFESSOR & H.O.D.,
DEPT. OF PUBLIC HEALTH
DENTISTRY,
BEST DENTAL SCIENCE COLLEGE,
MADURAI-625104.

GUIDE

Dr. UMESHK M.D.S.

Professor,

Department of

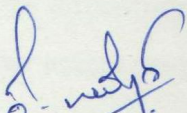
Public Health Dentistry

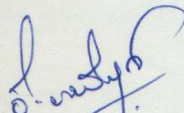
PROFESSOR & H.O.D.,
DEPT. OF PUBLIC HEALTH
DENTISTRY,
BEST DENTAL SCIENCE COLLEGE,
MADURAI-625104.

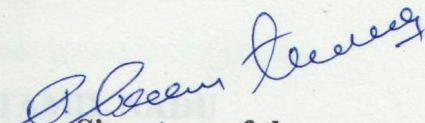
DECLARATION

<p>TITLE OF THE DISSERTATION</p>	<p>“ASSESSMENT OF ORAL HEALTH STATUS AND EFFECTIVENESS OF AN ORAL HEALTH EDUCATION PROGRAM IN 5- 15 YEARS OLD HEARING IMPAIRED SPECIAL CHILDREN- AN INTERVENTIONAL STUDY, MADURAI”</p>
<p>PLACE OF STUDY</p>	<p>BEST DENTAL SCIENCE COLLEGE, MADURAI – 625104.</p>
<p>DURATION OF THE COURSE</p>	<p>3 YEARS</p>
<p>NAME OF THE GUIDE</p>	<p>Dr. UMESH.K M.D.S.,</p>
<p>HEAD OF THE DEPARTMENT</p>	<p>Dr. UMESH.K M.D.S.,</p>

I hereby declare that no part of the dissertation will be utilized for gaining financial assistance/any promotion without obtaining prior permission of the Principal, Best Dental Science College, Madurai – 625104. In addition, I declare that no part of this work will be published either in print or in electronic media without the guide who has been actively involved in dissertation. The author has the right to reserve for publish of work solely with the prior permission of the Principal, Best Dental Science College, Madurai – 625104.


HOD


GUIDE


Signature of the candidate

Dr. UMESH.K M.D.S.,
Professor,
Department of

Dr. UMESH.K M.D.S.,
Professor,
Department of

Public Health Dentistry

Public Health Dentistry

PROFESSOR & H.O.D.,
DEPT. OF PUBLIC HEALTH
DENTISTRY,
BEST DENTAL SCIENCE COLLEGE,
MADURAI-625104.

PROFESSOR & H.O.D.,
DEPT. OF PUBLIC HEALTH
DENTISTRY,
BEST DENTAL SCIENCE COLLEGE,
MADURAI-625104.

COPYRIGHT

DECLARATION BY THE CANDIDATE

This agreement herein after the "Agreement" is entered into on this day Dec 2012, between the Best Dental Science College represented by its Principal having address at Best Dental Science College,

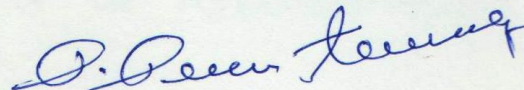
I hereby declare that The Tamil Nadu Dr.M.G.R Medical University, Tamil Nadu shall have the rights to preserve, use and disseminate this research in print or electronic format for academic/ research purpose.

Dr. UMESH, K, aged 40 years working as Professor in Department of Public Health Dentistry at the College, having residence address at No. staff quarters, Ultra's Best Dental Science College, Madurai-625104 (herein after referred to as the 'Principal Investigator')

And

Dr. PREMKUMAR, P, aged 28 years currently studying as Post Graduate student in Department of Public Health Dentistry, Best Dental College, Madurai- 625104 (herein referred to as the 'PG/Research student and co-investigator')

Date: 19.01.2019


Signature of the Candidate

Place: MADURAI

(Dr. P. PREMKUMAR)

whereas the PG/Research student as part of her curriculum undertakes to research on "ORAL HEALTH STATUS AND HEALTH EDUCATION PROGRAM IN 5- 15 YEARS OLD HEARING IMPAIRED SPECIAL CHILDREN- AN INTERVENTIONAL STUDY, MADURAI" for which purpose the Principal Investigator shall act as Principal Investigator and the college shall provide the requisite infrastructure based on availability and also provide facility to the PG/Research student to the extent possible as a Co-investigator.

whereas the parties, by this agreement have mutually agreed to the various issues including in

©THE TAMIL NADU DR. M.G.R.MEDICAL UNIVERSITY, TAMIL NADU

this agreement witnessed as follows

TRIPARTITE AGREEMENT

This agreement herein after the "Agreement" is entered into on this day Dec 2018, between the Best Dental Science College represented by its **Principal** having address at Best Dental Science College, Madurai – 625104, (hereafter referred to as, 'the College')

And

Dr. UMESH. K, aged 40 years working as **Professor** in Department of Public Health Dentistry at the College, having residence address at No staff quarters, Ultra's Best Dental Science College, Madurai-625104 (herein after referred to as the 'Principal Investigator')

And

Dr. PREMKUMAR. P, aged 28 years currently studying as **Post Graduate student** in Department of Public Health Dentistry, Best Dental College, Madurai- 625104 (herein after referred to as the 'PG/Research student and co-investigator')

Whereas the PG/Research student as part of her curriculum undertakes to research on "**ASSESSMENT OF ORAL HEALTH STATUS AND EFFECTIVENESS OF AN ORAL HEALTH EDUCATION PROGRAM IN 5- 15 YEARS OLD HEARING IMPAIRED SPECIAL CHILDREN- AN INTERVENTIONAL STUDY, MADURAI**" for which purpose PG/Principal Investigator shall act as Principal Investigator and the college shall provide the requisite infrastructure based on availability and also provide facility to the PG/Research student as to the extent possible as a Co-investigator.

Whereas the parties, by this agreement have mutually agreed to the various issues including in particular the copyright and confidentiality issues that arise in this regard.

Now this agreement witnessed as follows

1. The parties agree that all the Research material and ownership therein shall become the vested right of the college, including in particular all the copyright in the literature including the study, research and all other related papers.
2. To the extent that the college has legal right to do so, shall grant to license or assign the copyright so vested with it for medical and/or commercial usage of interested persons/entities subject to a reasonable terms/conditions including royalty as deemed by the College.
3. The royalty so received by the college shall be shared equally by all the parties.
4. The PG Student and Principal Investigator shall under no circumstances deal with the copyright, Confidential information and know – how generated during the course of research / study in any manner whatsoever, while shall sole vest with the college.
5. All expenses pertaining to the research shall be decided upon by the Principal Investigator/Co-investigator or borne solely by the PG/Research Student, (co- investigator).
6. The college shall provide all infrastructure and access facilities within and in other institutes to the extent possible. This includes patient interactions, introductory letters, recommendation letters and such other acts required in this regard.
7. The Principal Investigator shall suitably guide the Student Research right from selection of the Research Topic and Area till its completion. However the selection and conduct of research, topic and area of research by the student researcher under guidance from the Principal Investigator shall be subject to the prior approval, recommendations and comments of the Ethical Committee of the College constituted for this purpose.

8. It is agreed that as regards other aspect not covered under this agreement, but which pertain to the research undertaken by the PG student, under guidance from the Principal Investigator, the decision of the college shall be binding and final.
9. If any dispute arises as to the matters related or connected to this agreement herein, it shall be referred to arbitration in accordance with the provisions of the Arbitration and Conciliation Act 1996.

In witness whereof the parties herein above mentioned have on this day, month and year herein above mentioned set their hands to this agreement in the presence of the following two witnesses.

College represented by its **Principal:**

Mony
19/11/19
PRINCIPAL
BEST DENTAL SCIENCE COLLEGE
MADURAI-625104.
PROFESSOR & H.O.D.,
DEPT. OF PUBLIC HEALTH
DENTISTRY,
BEST DENTAL SCIENCE COLLEGE,
MADURAI-625104.

Student Guide:

[Signature]

PG Student:

P. Beem *[Signature]*

Witnesses:

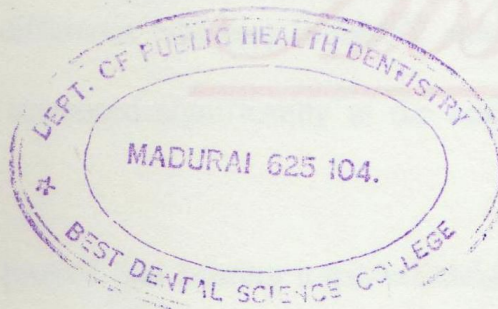
1.

[Signature]

READER
PUBLIC HEALTH DENTISTRY
BEST DENTAL SCIENCE COLLEGE
MADURAI

2.

A. Palani



Abstract

INTRODUCTION: The disabled children such as physically, mentally and socially handicapped are neglected by their own nearest and dearest ones as well as society. This negligence adversely affects the psychological status of disabled people which in turn affects the oral health.

AIM AND OBJECTIVES: The purpose of this study was to evaluate the effectiveness of oral health education program on oral health status among hearing impaired special children aged 5- 15 year old in Madurai City.

MATERIALS AND METHODS: The study population was selected from two available institutions for hearing impaired, in Madurai city. The final sample consisted of 217 subjects and the age range of study participants varies from 5 to 15 years old of both genders. After collecting the baseline data, oral health education and motivation was imparted at different time intervals with the help of visual aids and demonstration method. Fones method and Modified Bass method of brushing were taught to the children. Oral health status was assessed by using WHO proforma 2013 at baseline and after the health education at 3 and 6 month intervals. The oral health awareness was assessed using a self administered questionnaire at the beginning and end of the study. Data were analysed using chi-square test, Wilcoxon signed rank test, Kruskal walis test, Friedman test and Mann Whitney U test.

RESULTS: At baseline, the mean gingival bleeding, DMFT and dft scores were 0.96, 2.64, and 2.21 respectively. At the end of 3 months and 6 months there was a significant decrease in gingival bleeding. No significant difference was seen in DMFT and dft at different time interval. The oral health awareness increased significantly at the end of the study when compared to the baseline scores.

CONCLUSION: The present study proved that hearing impaired children can maintain an acceptable level of oral hygiene when taught with special customized methods like multisensory approach with creative use of other senses.

DENTAL PUBLIC HEALTH SIGNIFICANCE: Hearing loss among school going children create a major impact on their life and the present study showed that prevalence of caries, gingival bleeding and traumatic dental injuries were most common among Hearing Impaired children. In-service training in the promotion of good oral health for children with hearing impairment, access to oral health care has been provided for teachers, institutional staff and parents of these under privileged children of god.

KEY WORDS:

Oral health education, Oral health status, Hearing impaired children

LIST OF ABBREVIATIONS

SL.NO	ABBREVIATION	MEANING
1	SPSS	Statistical Package for Social Sciences
2	IBM	International Business Machines
3	WHO	World Health Organization
4	DMFT	Decayed, Missing, Filled permanent Teeth
5	DFT	Decayed, Filled primary Teeth
6	ISL	Indian Sign Language
7	SD	Standard Deviation

LIST OF FIGURES

Sl.NO	Title	Page no
1	MAP SHOWING MADURAI DISTRICT BLOCK	26

LIST OF TABLES

Sl.NO	Title	Page no
1	Distribution of the study subjects according to age, gender, socioeconomic status and location	39
2	Distribution of study subjects into three age groups with respect to gender	40
3	Responses of the study subjects to questionnaire with respect to knowledge	41
4	Responses of study subjects to questionnaire with respect to attitude	43
5	Responses of study subjects to questionnaire related to Practice for maintaining oral health	44
6	comparison of Mean scores of knowledge, attitude and practice of study subjects at baseline and after intervention	47
7	Gender wise distribution of study subjects based on their Periodontal Status at baseline	47
8	Distribution of Periodontal Status according to age groups at baseline	48
9	Age group wise distribution of mean DMFT among study subjects at baseline	48

10	Gender wise distribution of mean DMFT among study subjects at baseline	49
11	Comparison of Periodontal Status among study subjects at different intervals	51
12	Comparison of Mean caries tooth (dt, DT), filled tooth (ft, FT) and missing tooth (MT) for Primary Dentition and permanent dentition among study subjects at different intervals.	52
13	Comparison of Oral Health Status of study subjects at different intervals	53

LIST OF GRAPHS

SL.NO.	Title	Page no
1	Oral Health Status of hearing impaired children aged 5-15 year old	50
2	Intervention urgency of hearing impaired children aged 5-15 year old	51

CONTENTS

SL.NO	TITLE	PAGE NO
1	INTRODUCTION	1
2	AIM AND OBJECTIVES	5
3	REVIEW OF LITERATURE	6
4	MATERIALS AND METHODS	26
5	RESULTS	39
6	DISCUSSION	54
7	CONCLUSION	60
8	RECOMMENDATION	62
9	REFERENCES	64

Introduction

Good health is a fundamental right, a social goal and an essential human need. Oral health is a major determinant and an intrinsic part of general health.¹ Oral health has strong biological, psychological and social consequences as it affects aesthetics, communication and quality of life of an individual. Good oral health is vital for proper mastication, digestion, appearance, speech and health. Oral health is a bridge between happiness and good general health and there is evidence that aesthetically unacceptable and functionally inadequate dentitions affect self-esteem, confidence and socialization.²

Unfortunately, oral health care is one of the most neglected needs of the disabled people. The adult onset hearing impairment is heeded to be third leading cause of disability. Hearing impairment can be classified as deaf and hard of hearing.³ A person who is not able to hear as someone with normal hearing thresholds of 25 dB or more in both ears is said to have hearing loss. Hearing loss may be of many kinds such as mild, moderate, severe or profound. It can affect either one ear or both ears and leads to difficulty in hearing the conversational speech or loud sounds.⁴

Hard of hearing people usually communicate through spoken language and can benefit from hearing aids, cochlear implants, and other assistive devices as well as captioning. People with more significant hearing losses could be benefitted through cochlear implants. 'Deaf' people usually have profound hearing loss, which ranges between very little or no hearing. They often use sign language for communication.⁴

The hearing impairment can be congenital or acquired. If the impairment is acquired early in life, it has been shown to have a devastating effect on the maturation of the child's brain and overall development.⁵

Among the total world's population, 5% of them i.e 360 million people has disabling hearing loss (328 million adults and 32 million children). Disabling hearing loss refers to hearing loss greater than 40 decibels (dB) in adults and a hearing loss greater than 30 dB in children. The majority of people with disabled hearing belongs to low and middle income countries. Approximately one third of people over age of 65 years are affected by hearing loss. The prevalence in this age group is greatest in South Asia, Asia Pacific followed by sub-Saharan Africa.⁴

Population based surveys conducted in 2003 in India using the WHO protocol estimated the prevalence of hearing impairment to be around 6.3% or approximately 63 million people suffering from significant auditory loss. The estimated prevalence of adult onset deafness in India was found to be 7.6% and childhood onset deafness to be 2%.⁶

Children with disabilities may have marked oral pathologies either because of their actual disability or for other medical, economic, social reasons, self-mutilating behaviors (excessive tooth grinding), cariogenic effect of medicines with high sugar content or even because of their parents' have difficulty in carrying out proper regular oral hygiene measures.⁷

Dental Caries is the most common oral disease of childhood that interferes with the nutrition intake, speech and daily regular activities, because its pain adversely affects the normal food eating. A normal child gets the love and affection from parents and society whereas the disabled children such as physically, mentally and socially handicapped are neglected by their own nearest and dearest ones as well as society. This negligence adversely affects the psychological status which in turn affects the oral health.⁸

Previous literature showed that among, the 76 children enrolled in the study, the caries prevalence was 42%. Gingivitis was seen in 35% of the children who required oral prophylaxis. The study showed that 19% of the subjects had malocclusion which constituted 3% of anterior open bite seen in, 11% of crowding and class II malocclusion seen in 3%. Fractured anterior teeth were seen among 3.9% of the children examined.⁹ The mean DMFT was 0.47 and it was higher than the visually impaired (0.19).^[10]

Numerous studies on the oral health status of the population have been carried out. However, very little information is available on the dental health of the handicapped population and various studies proved that oral health education has either direct or indirect beneficial in oral health of the children. Hence potential interventions to educate these children are essential regarding oral health^[2]

A sincere attempt was made to assess the oral health status and educate the individuals with impaired auditory function in special schools for hearing impairment in Madurai city. It is hoped that this study will provide some inputs and data useful for assisting the oral

health care providers in implementing the oral health promotion programs for the hearing impaired individuals in order to improve their oral health. Hence, the purpose of the present study was to evaluate the effectiveness of health education program on oral health status among 5- 15 year old hearing impaired special children.

Aim and Objectives

Aim:

- To evaluate the effectiveness of oral health education program on oral health status among hearing impaired special children aged 5- 15 year in Madurai City.

Objectives:

- To assess the oral health status of hearing impaired special children in Madurai city.
- To assess the knowledge, attitude and practice of oral health among hearing impaired special children in Madurai city.
- To provide educational intervention about oral health among hearing impaired special children in Madurai city.
- To reassess the oral health status of the hearing impaired special children in Madurai city.
- To reassess the knowledge, attitude and practice of oral health among hearing impaired special children in Madurai city.
- Comparative evaluation of oral health status among hearing impaired special children in Madurai city before and after the intervention.

Review of Literature

A.G. Mitsea et al (2002) consider that nowadays there is a sharp increase of population with disabilities. The aim of this investigation was to survey the dental health status, estimate the treatment requirements of children and adolescents with cerebral palsy, mental retardation and visual disorders and to estimate the oral health status of these groups of individuals. The clinical examination comprises 170 individuals, between 6 and 15 years old, who were attending four special schools in Athens, Greece. In conclusion, the investigation documents the treatment needs regarding both dentitions are extremely high in all groups of individuals. The result shows that especially in the individuals with mental retardation, oral hygiene status is in general, moderate to low-grade. The highest rate of malocclusion is observed in the group of individuals with cerebral palsy.¹¹

Steven Barnett (2002) conveys that some physicians may be insufficiently prepared to work with the many patients who have hearing loss. Approximately 9% of the U.S. population have hearing loss and the prevalence is increasing. Communication difficulty was reported by patients with hearing loss and their physicians also felt less comfortable with these patients. Eventhough communication with patients plays a vital role in determining diagnoses and management, little attention is given to teaching medical students and residents the skills necessary to facilitate communication when hearing loss is involved. The need for these skills will increase with the expected rise in the number of such patients and also presents the rationale for including information about hearing loss in curricula on patient–doctor communication, and suggests curricular content, including background regarding hearing loss and techniques that can enhance the physician’s ability to listen to and learn about the stories of these patients.¹²

Z. AL-Qahtani, A. Hwne (2004) says that the dental health of disabled children is very important for several reasons. In these children due to behavioral problems, dental treatment was difficult to perform and often requires deep sedation or general anesthesia in a hospital setting. The purpose of the present study was to determine the caries prevalence, severity and oral hygiene status in blind, deaf and mentally retarded female children attending the Presidency of Girls' Education schools in Riyadh. In the study, 6-7-year-old and 11-12-year old blind, deaf and mentally retarded registered children were included in the study. Result shows in 6-7-year-old group, the blind, deaf and mentally retarded had similar dmft scores but among the 11-12-year old children, the mentally retarded children had the highest dmft followed by deaf children and concluded the caries prevalence and experience in all the three special groups of children i.e. blind, deaf and mentally retarded were very high. The numbers of blind, deaf and mentally retarded children with poor oral hygiene were very high.¹³

Dinesh Rao et al (2005) conducted a study to evaluate the oral hygiene status of disabled children and young adults attending special schools in South Canara, Karnataka, India. The disabled individuals of aged between 3 and 20 years attending the district's eight non-residential special schools were examined by a single investigator during February to April 2002. The simplified oral hygiene index was used to assess the Oral hygiene levels and a modified version of this index was used to evaluate primary dentition. By questioning parents or adult guardian the information regarding tooth cleaning habits was obtained. Result shows that out of 524 subjects recruited, the simplified oral hygiene indices in primary, mixed, and permanent dentitions were 1.48 (standard deviation, 0.93), 2.12 (1.09), and 2.76 (1.20), respectively. The worst oral hygiene (overall score, 3.22) was seen in subjects with severe intellectual disabilities, followed by those with moderate intellectual disabilities (2.87). Compared to other disabled individuals, hearing

and visually impaired subjects had better oral hygiene (1.49 and 2.04) respectively. Subjects using toothbrush and toothpaste had better oral hygiene than those using other indigenous modes of cleaning and concluded disabled children experience greater challenges to proper oral hygiene and health care, often due to a lack of basic manual skills and intellectual abilities that precludes adequate practices, such as tooth brushing. Thus Organized and planned action by India's dental professionals and community and public health authorities is required to address the discrepancies in oral health and hygiene among disabled children and address the barriers to education and care that include cost, fear, and social attitudes.¹⁴

Loan P. Dao et al (2005) conveys that Special needs patients are one of the underserved dental patient groups in the United States. They conducted a study which investigates whether under graduate dental education about special needs patients affects general dentist's professional behavior, practice, characteristics, and attitudes concerning special needs patients. Data were collected From 208 general dentists (178 male/30 female; average age: 49.85 years) who are members of the Michigan Dental Association, the data were collected. The more the respondents agreed that dental education had prepared them well, the more likely they were to treat various types of special needs patients and they liked more treating these patients. In conclusion, most general dentists did not think their undergraduate dental education had prepared them well to treat special needs patients. However, some reported to have been educated, the more likely they were to treat special needs patients. The access to care problems for many special needs patients was given, but it seems crucial to revise dental curricula and provide more didactic and clinical education concerning the treatment of special needs patients.¹⁵

Stavros Petrou et al (2007) performed a study to describe the health status and health related quality of life preference-based outcomes of children with diagnosed bilateral permanent childhood hearing impairment and a comparison was done between groups of English-speaking children with normal hearing. We studied total of 120 children aged 7 to 9 years and had bilateral permanent childhood hearing impairment of moderate or greater severity, identified from a cohort of 156 . In which from 8 districts of southern England, 733 children were born and 63 English-speaking children with normal hearing and the same place of birth and age at assessment. The Health Utilities Index Mark III was used to interview principal caregivers and questionnaire for proxy-assessed usual health status assessment. Result shows Bilateral permanent childhood hearing impairment is associated with significantly increased proportions of suboptimal levels of function and significantly lower single-attribute utility scores in 6 of the 8 attributes in Health Utilities Index Mark III: vision, hearing, speech, ambulation, dexterity, and cognition. Compared with the children with normal hearing, the mean multi attribute utility score for the children with hearing impairment was significantly lower for both the whole group and the moderate, severe, and profound severity subgroups. The differences in the distributions of the multi attribute utility scores between the children with hearing impairment as a group and the children with normal hearing and between each of the severity subgroups and the children with normal hearing all were statistically significant and concluded that this study provides rigorous evidence of an association between bilateral permanent childhood hearing impairment and diminished health status and health-related quality of life preference-based outcomes during mid childhood. ¹⁶

Santhosh kumar et al (2008) conducted a study examined the oral hygiene levels and periodontal status in a group of children and adults with hearing impairment attending a special

school in Udaipur, India. The Simplified Oral Hygiene Index (OHI-S) of Greene and Vermillion was used to assess oral hygiene status and periodontal status by the Community Periodontal Index. A bivariate analysis shows that all the oral hygiene variables varied significantly with age, economic status, and education of the parents. A multiple regression analysis also showed that the single best predictor for oral hygiene status was the education of the mother and explained 92% of the variance. These findings reveal that poor oral hygiene and high levels of periodontal disease were seen in children with hearing impairment, which may be due to a lack of communication. Therefore appropriate oral health education should be tailored to the needs of these students with the support of their teachers and their parents.⁵

Suneela Garg et al (2009) narrates that the high burden of deafness globally and in India is largely preventable and avoidable. 278 million people have disabling hearing impairment according to the 2005 estimates of WHO. The prevalence of deafness is from 4.6% to 8.8% in Southeast Asia. In India, nearly 63 million people (6.3%) suffering from significant auditory loss. The Nationwide disability surveys have estimated the second most common cause of disability is hearing loss. A huge challenge in this problem is lack of skilled manpower and human resources. The National Programme for Prevention and Control of Deafness was launched by the Government of India. The major components of the programme with a focus on manpower development and ear service provision including rehabilitation has been highlighted in this article. Since the programme is also being implemented at the primary healthcare level, it envisages a reduction in the burden of deafness and prevention of future hearing loss in India.⁶

Shivlal Rawlani et al (2010) conducted a study to assess the oral health status of deaf and mute children attending special school. It is a cross-sectional descriptive survey, which was conducted among 7 to 18 years deaf and mute children with a total of 137. A total of 76 males

(55.47%) with mean age of 14.2 ± 4.5 and 61 females (44.53%) with mean age of 13.8 ± 4.2 years and studying in a school for deaf and mute children in Warora were considered. The standard method recommended by WHO for the oral health survey in 1977 was used to collect data. Oral health status was assessed using OHI-S, Loe and Sinless, and CPI Index along with DMFT and DMFS Index. Gingival position was considered for measuring attachment loss. Result shows the mean DMFT was found to be 2.53 ± 1.72 , and mean DMFS, 3.37 ± 3.16 . The prevalence of dental caries was pegged at 35.32%, with mean OHIS score at 1.49 ± 0.76 . Overall gingival index among deaf and mute children was 0.81 ± 1.46 , whereas that for the upper arch and lower arch was 0.9 ± 0.84 and 1.19 ± 0.95 , respectively. The mean score for the CPI Index among deaf and mute children was found to be 0.42 ± 0.32 . Gingival clinical attachment loss was found to be 0.26 ± 0.15 mm and concluded these findings suggest that children with hearing disabilities can also have good oral hygiene comparable to normal individuals of the same age group.¹⁷

Manish Jain et al (2013) conducted a study to assess and compare the oral health status and the treatment needs of the institutionalized hearing-impaired and blind children and young adults in the city of Udaipur, Rajasthan, India. A descriptive cross-sectional study was conducted among 498 institutionalized hearing-impaired and blind people, aged 4 to 23 years, in the city of Udaipur, Rajasthan. For data collection the World Health Organization oral health assessment basic methods and form (1997) were used. At institute's medical room or classroom clinical examinations was carried out by single examiner with the aid of a mouth mirror, explorer and Community Periodontal Index (CPI) probe under adequate natural light (Type III examination). The resulting data were entered into statistical software and analyzed by applying the chi-square test, ANOVA, *t*-test and stepwise multiple linear regression analysis. Result indicated the total mean DMFT (decayed-missing-filled teeth) and mean dft scores were 1.77 and 0.27 respectively.

The D was the largest component of DMFT with a mean of 1.49. The F component of 0.08 was very low. Mean DMFT/dft was greater among hearing-impaired than among blind subjects. Finally, 159 (32%) were periodontally healthy (CPI=0), 162 (32%) had shallow pockets (CPI=3) and 36 (7%) had deeper pockets (CPI=4). Increased percentage of the blind (87;43%) than the hearing-impaired (72; 24%) subjects were periodontally healthy (CPI score=0). The most commonly provided form of past treatment was One-surface fillings. Conclusion states that the findings in this study highlight the lack of dental treatment for this group. Overall oral health status was poorer in the hearing-impaired than in the blind subjects.²

Venkataraam Sanjay et al (2013) planned a study to assess the dental caries status among disabled children as dental health is an integral part of general body health and this group is deprived of health care needs. The sample includes 310 disabled children, consisting of 195- Hearing impaired, 115 – blind and in which 226 were males and 84 were females. A questionnaire was formulated including demographic information and WHO oral health assessment form (1997) was used to record dental caries status. Student's test and ANOVA test was used at $p \leq 0.05$ for analyzing data. Result shows overall mean for DMFT scores for males and females was 2.11 (1.753) and 1.75 (1.275) respectively. Similarly 0.31 (0.254) for males and 0.27 (0.143) for females was the overall mean dft. Mean DMFT of blind students was higher when compared to hearing impaired ones as 2.16 (2.005) and 1.80 (1.264) respectively. Age factor showed a significant increase in the mean DMFT scores with advancing age at $p \leq 0.001$. Conclusion shows overall mean scores of caries was very high and it increased with increasing age. Blind children experienced more caries than hearing impaired children in permanent, whereas it was opposite in primary dentition. So there is urgent need of both comprehensive and incremental dental care for this subgroup of population.⁸

Sandeep V et al (2014) conveys that Children with hearing impairment (CHI) have poor oral health and extensive unmet treatment needs. This corresponds to their inability to cooperate with dental treatment and lack of oral health awareness due to communication barriers. Thus the aim of this study was to verify the effect of visual instruction on oral hygiene status of CHI. The study design is Prospective triple blind interventional study. The Oral hygiene status of 372 institutionalized CHI aged 6-16 years was assessed and divided into study (180) and control groups (192) which was evaluated using Loe and Silness Gingival index and Silness and Loe Plaque index. To the study group motivation was done in the form of visual instruction for every weekend for 12 weeks and control group was followed without motivation. Oral hygiene status was re-assessed and analyzed. To compare the scores before and after the instructions Paired *t*-test was used. For intergroup comparison between the study and control groups unpaired *t*-test was used. Result indicates there was a significant mean reduction of plaque (0.37) and gingival scores (0.39) in the study group, but only marginal reduction of plaque (0.08) and gingival scores (0.1) observed in the control group. Significant gender and age variations were observed and concluded that visual instruction was found to be an effective oral health education tool in CHI.¹

Tippanart Vichayanrat and Waritorn Kositpumivate (2014) conducted a study aimed to explore oral health and oral health related behaviors among hearing impaired and normal hearing students at Rachasuda College. The association of dental caries status with socioeconomic factors, hearing status, oral health behaviors, oral hygiene levels was examined. With assistance of a sign language video the students filled out a self-administered questionnaire in order to obtain personal and behavior information. The questionnaire was completed by 180 students, in which 83 are normal hearing and 97 are hearing impaired students and they underwent an oral examination. The result shows that the prevalence of caries were 53.6% and

50.6% among students with hearing impairment and normal hearing, respectively ($p=0.354$). After stratifying according to age, the hearing impaired students aged 18-21 years had significantly less filled teeth ($p=0.012$), and those older than 21 years had less missing teeth due to caries than normal-hearing students ($p=0.023$). 51.8% and 42.2% of normal and hearing-impaired students, have poor oral hygiene respectively ($p=0.365$). With maternal education level (OR 3.56; 95% CI: 1.52-8.32) and oral hygiene (OR 3.26; 95% CI: 1.64-6.45) caries status was significantly associated. The result indicates that high prevalence of dental caries and poor oral hygiene among college students is alarming. Hearing impairment did not appear to affect the prevalence of these conditions compared to those with normal hearing. Oral health education tools need to be developed and utilized for both normal hearing and hearing impaired college students in Thailand.¹⁸

Vinay K Bharadwaj et al (2014) states that the oral health of the disabled may be neglected because of the disability condition, demanding diseases or limited access to oral health care. It has been reported that dental treatment is the greatest unattended health need of the disabled. The Present study was conducted to assess the prevalence of dental caries and treatment needs among hearing and speech impaired children in Shimla city, Himachal Pradesh. 202 institutionalized subjects aged 5-22 years attending special school were examined. Data was recorded using modified WHO survey 1997 proforma. Dentition status and treatment needs using DMFT, DMFS, dmft, dmfs were recorded. The data was analysed using the software version 15 (SPSS Inc. Chicago). ANOVA, Chi-square test and multiple regressions were applied appropriately. Result shows among study subjects, largest component of DMFT was the D component, with a mean of 1.47. Highest mean DMFS was recorded for the age group 18-22 years. A major proportion was not accounted by missing surfaces and filled surfaces. Mean dmft

and dmfs scores were 1.04 and 1.73, respectively. Out of 202 subjects examined, 182 (90.1%) required treatment. One surface restoration was the most common treatment required followed by two surface restorations, pit and fissure sealants and pulp care and concluded that high prevalence of dental caries among special children is a highly alarming situation and needs immediate attention. Filled teeth are very less, which reflects the provision, and availing of dental care is almost negligible. Awareness should be created among parents and teachers by oral health educators about importance of oral health.¹⁹

Aram M Hamad et al (2015) stated that there is no information available regarding the dental health care and needs of hearing-impaired individuals. Such information is important to improve the oral health in these special need persons. The aims of this study are to check the oral health status and determine attitude of hearing-impaired person toward dentistry. A hundred hearing-impaired volunteers were screened in Basic Hewa Institute for hearing impaired and the oral hygiene status was checked by group of dentist at the same time. The attitudes of participants toward dental health were collected interview questionnaire. Results indicates that the data of this study shows that most of hearing-impaired participants have good to fair oral status (90%) and 81% of them have tooth brushing at least once a day. Family shows to have great impact of these people on their attitude about oral health (50%) followed by advice from school (28%). Finally, Majority of the participants tends to rely upon themselves for their oral hygiene measures and concluded that the findings of this study revealed that despite the hearing difficulty, These people managed to keep their oral health status at good levels and a little extra care by the parent or caretaker regarding oral hygiene can give further improvement.²⁰

Liliya Doichinova, Milena Peneva (2015) conducted a study to determine the incidence of dental caries in hearing impaired children from 5 to 12 years old and a control group of

healthy peers in Sofia. The study includes 100 hearing impaired children and a control group of 100 healthy children. The prevalence of dental caries was assessed with index of the Klein, Palmer & Knutson (1938) - DMFT, taking into account the total number of teeth that are carious (D), missing (M), due to caries or filling (F). The results obtained show that the incidence of dental caries in 89% of the hearing impaired children and 76.8% of healthy peers is over 4 DMFT. 5.02 and 4.39 is the value of the DMFT index in both groups is respectively. The results clearly show the need for preventive measures to improve the dental health of children.²¹

Mariam A H Khalaf et al (2015) performed a study which was carried out to determine the prevalence of oral health problems and treatment needs of children with hearing loss and also to evaluate the parents' and/or caregivers' attitude and knowledge towards oral health care. This study was done on a hundred children and their parents, those who are attending the Hearing and Speech Institute, Imbaba, Giza, for audiological examination. The age of the children in the study was between 3-12 years old. It was a questionnaire-based survey from which data is collected; the children were examined for their dental caries experience, unmet treatment needs, oral hygiene level, dental occlusion, oral habits and teeth abnormalities and the history of previous dental visits, frequency of tooth brushing were also recorded. Regarding caries assessment, dmf, def and DMF indices were used and the OHI-S was used for oral hygiene assessment. The oral health attitudes and behavior of parents were recorded using the HU-DBI questionnaire and concluded hearing impaired children have high prevalence of dental caries. In these children preventive and restorative treatment needs are unmet. In children with hearing loss malocclusion and/ or oral habits are reported. The frequency of hearing aid use is matching with the history of dental visits and the frequency of tooth brushing. The parents of children with hearing loss had poor oral health attitude and knowledge. Negative correlation was seen in the

parents of the children with hearing loss have oral health attitude and oral hygiene behavior to unmet treatment needs, OHI-S and oral habits of their children. The parents of the children with hearing lo have diet knowledge; however alone it is not enough, the implementation of this knowledge is equally important.²²

Raluca diana suhani et al (2016) states that Dental fear and anxiety is a major barrier for dental care provision. Recognizing anxious patients enhances dental professionals to manage them appropriately. The aim of the study is assessing dental fear and anxiety among a hearing impaired in Cluj-Napoca, Romania and their associated and contributing factors. This is cross sectional study in which 165 deaf participants were invited to complete a questionnaire The study comprises of three sections. The first section had questions about social and economical status, the second section comprises of a Romanian version of the Modified Dental Anxiety Scale (MDAS) and the third was the Dental Fear Survey (DFS). The Data was introduced and analyzed with the Statistical Package for Social Sciences (SPSS) program, version 20.0 (SPSS Inc., Chicago, Illinois, USA).34.9% of respondents were insignificantly anxious, whereas 59.7% were moderate or high anxious in which 5.3% being identified with dental phobia based on the MDAS scores. Finally mean total score for dental anxiety on the MDAS scale was 13.7. Patients who were suffering from a prior negative experience were found to be more anxious ($p < 0.05$) and concluded that Dental fear and anxiety is extensive in the deaf communities. Higher percentages were observed among women and people with a previous traumatic dental experience.²³

Sandeep V et al (2016) stated that children with hearing impairment (CHI) have special accessibility issues to meet their health care needs. The oral health status of these children's were deprived and has wide ranging treatment needs to attend. The aim of this study was to determine

the oral health status and treatment needs of CHI attending a special school in Bhimavaram Town, India. The study design was a descriptive cross-sectional study and conducted in November 2012 at SVS special school for deaf, Bhimavaram, India. This study includes 180 CHI of both genders, aged 6–16 years, divided into Group-I (6–8 years), Group-II (9–12 years), and Group-III (13–16 years). The standards recommended by the WHO for Oral Health Surveys, 1997 was used to record Oral health status and treatment needs were recorded. Dental caries prevalence (decayed, missing, and filled teeth [DMFT/dmft]), gingivitis levels (Löe, Silness Gingival Index), plaque levels (Silness, Löe Plaque index), and treatment needs were the parameters recorded and analyzed. For proportion Z-test, one-way analysis of variance, and Chi-square test were used in order to analyze the data. Result indicates the prevalence of dental caries in the sample was found to be 65% with a mean level of caries prevalence (DMFT) of 1.6 ± 1.3 in Group-I, Group-II as 1.9 ± 1.2 and 2.2 ± 1.2 in Group-III. Nearly about 91.7% of the total children examined were in need of treatment. The mean plaque and gingivitis scores of the sample were 1.70 ± 0.61 and 1.59 ± 0.58 , respectively and concluded these findings imply the overwhelming situation of CHI in oral health perspective. Hence, prevention-based educational and motivational programs should be targeted to this vital group to achieve adequate oral hygiene levels.²⁴

Avinash Jnaneswar et al (2017) to assess the prevalence of dental caries and periodontal status of institutionalized hearing impaired (HI) children in Khordha district of Odisha. A descriptive Cross sectional study was conducted in Khordha district, Odisha among hearing impaired children. Type III examination procedure was performed to assess the oral health status of the children. Statistical analysis used was Chi square test and Student's *t* test, and the significance level was fixed at $P < 0.05$. The final population comprises of 540 HI children in

which 262 (48.5%) were male and 278 (51.5%) were female, 285 (52.8%) children had severe hearing loss and 227 (42.0%) had profound hearing loss. Bleeding on probing was seen in 72 (13.3%) female children as compared to 57 (10.6%) male children. Among them 131 (24.3%) female children had calculus, 124 (23.0%) male children had the same condition. Total caries prevalence was 19.3%. Statistically highly significant difference was seen for mean decayed teeth (DT), missing teeth decayed, missing filled teeth (FT) ($P < 0.001$), while for mean FT there was no statistically significant difference according to age groups. Statistically highly significant difference was found for mean DT, extracted teeth and decayed, extracted, filled teeth ($P < 0.001$). An enhanced accessibility to dental services as well as dental health education is compulsory to ensure the optimum dental health within the reach of these less fortunate children.²⁵

Gema Nazri Yanti et al (2017) done a study to know the effectiveness of dental health education using cartoon video showing method on knowledge and oral hygiene of deaf student before, after and a week after dental health education. A clinical experimental study was performed with pre and post-test group design. Sample taken were 92 deaf children aged 10-15 years at Yayasan Karya Murni Medan. The dental health education was provided using cartoon video showing method that uses a sign language in such a ways so it can be understood by the deaf children. Knowledge score was measured using questionnaire and oral hygiene score was measured using OHIS index. Initial knowledge and oral hygiene score was assessed at day 1 and then give them dental health education using the cartoon video showing and training how to brush the tooth properly and it was measured again at day 2. Dental health education with cartoon video keep being played repeatedly for a week before the class started, then measured again at day 8. To scrutinize the differences of knowledge and oral hygiene score before, after

and one week after dental health education paired t test was used. The Results indicatess that the level of the knowledge increased significantly from $7,73\pm 0,38$ before education to $10,75\pm 0,42$ after education, and risen to $14,23\pm 0,30$ one week after education ($p=-0,000$). There was significant differences observed in the oral hygiene score before $2,75\pm 1,33$, after $1,90\pm 1,37$ and a week after dental health education $1,46\pm 1,08$ ($p=0,000$). Dental health education using cartoon video showing method is efficient in increasing knowledge and decreasing oral hygiene score in deaf children.²⁶

K. M. Shivakumar et al (2017) conducted a study with an aim to assess the oral hygiene status, dental caries levels, and periodontal status among the sensory impaired children at satara district India. Among 150 disabled children aged 5–22 years attending a school for the sensory impaired children of Satara district, India a cross sectional survey was conducted. Using Type III clinical examination the subjects were examined. Oral hygiene status by oral hygiene index simplified, decayed, missing, and filled teeth/surface (DMFT/S) index, periodontal status by community periodontal index, and dentition status and treatment needs were assessed. ANOVA and Chi square test were used and $P < 0.05$ was considered statistically significant. The highest component was the decayed component among DMFT/dmft, with a mean of 2.71 ± 1.92 . The $P < 0.05$ was statistically significant. The Calculus Index-Simplified and OHI-S index showed a significant difference between males and females of the study population ($P < 0.05$, S). Of 150 subjects examined, 72.6% subjects needed one surface filling, while 21.3% needed two surface fillings, 15.3% needed pit and fissure sealant application, 10% needed pulp care, and 6% needed tooth extraction. There is a startling situation for dental diseases among special children. Hence, it is therefore recommended to encourage their parents and school teachers in order to promote and improve their dental health.²⁷

Trentin M.S et al (2017) conducted a study to determine the prevalence and severity of dental caries, missing and restored teeth (DMFT) and the efficiency of oral health programs from age 11 to 38 among patients with intellectual disabilities, who attended at the Association of Exceptional Children's Parents and Friends (APAE) in Passo Fundo, southern Brazil. The prevalence of dental caries was evaluated by DMFT in 109 patients. The mean and standard deviation were assessed by One-way ANOVA with 5% significance level. Result shows 47 of the evaluated students were female and 62 male, with moderate mental disability, Down syndrome, cerebral paralysis and epilepsy. The DMFT average was 3.93 for 11-14 years, 3.47 for 15-19 years, 4.74 for 20-30 years and 5.68 for the group 31-40 years. There were no significant differences among the DMFT index, gender and intellectual disability for the groups and concluded that Patients had acceptable oral hygiene within their limitations, suggesting that prevention and dental care program developed in APAE-PF/RS could be used as a model for health care for patients with intellectual disabilities in other institutions and other cities.²⁸

Yadav et al (2017) performed a study to assess the prevalence of dental caries and periodontal disease status in deaf and mute children. From the four special schools in Jaipur city, a total of 257 deaf and mute children were included. Dental caries and periodontal disease status was assessed. Data thus composed subjected to statistical analysis using frequency distribution. It was noted that 15.18% and 30.74% children had dental caries in primary and permanent teeth respectively. Community periodontal index (CPI) score shows that majority of the subjects (45.53%) had bleeding on probing, 31.13% and 2.72% had calculus & periodontal pocket 4-5 mm respectively. The results of the study obviously reflect that there is a need for preventive measures to progress the oral health of these children so that we can prevent dental caries and periodontal diseases.²⁹

Yazeed Al-Qahtani et al (2017) experimented a study to assess dental caries prevalence and severity in hearing-impaired (HI) and deaf adolescent male students in Eastern Saudi Arabia. A cross-sectional study was performed with 109 male students (46 HI and 63 deaf) between the ages 12-18 yrs. The study group was compared with 218 control students with no hearing disabilities. Two trained examiners conducted clinical examinations to assess the prevalence of dental caries using the Decayed, Missing, Filled surfaces (DMF/S) index. Data were analyzed by age category (12-14yrs, >14-16yrs, and >16-18yrs) and by hearing disability. The DMF/S index was dichotomized at the 75th percentile to establish the severity of dental caries. More than two-thirds of the students had “Decayed” surfaces. The differences noted was statistically significant ($P=0.003$) between the HI and control groups for those 12-14 yrs of age. Twelve percent of the sample was caries free and 22% had severe dental caries (mean DMF/S>13). Dental caries was more ubiquitous in the deaf and HI groups compared to the controls. Severe dental caries was more common in the deaf than in the HI and Public health efforts are needed to address the high caries prevalence.³⁰

Akshatha Gadiyar et al (2018) performed a study with a aim to evaluate the relationship between oral health behavior and dental caries experience among children’s with special care needs (CSHCNs). The cross sectional study consisting of 223 CSHCNs from special educational schools in Goa. A self administered parental questionnaire was used to collect data on socio demographic characteristics and oral health behavior variables. For dental caries Type III clinical examination was done using the World Health Organization criteria. Statistical analysis was done using SPSS version 19.0. The mean age of the study sample was 13.85 ± 7.2 years. Seventy two percent of the study sample had not at all visited a dentist. Majority of the study participants (57.4%) brushed their teeth once daily. The caries prevalence was 68.6%. The mean of decayed,

missing, and filled teeth index was 2.83 ± 3.23 and 0.35 ± 1.00 , for permanent dentition and primary dentition of the study participants respectively. Dental caries was significantly associated with frequency of brushing and dental visits. The caries experience was high among children with special needs in Goa. There is a noteworthy association between oral health behavior and dental caries experience. Oral health promotion may lead to decline in dental caries level, thus reducing the emotional, physical, and financial drain on their caregivers.³¹

Mohammed Mustafa et al (2018) had done a study which aims to evaluate the awareness level of the individuals with hearing and speech impairments (deaf and dumb individuals), in relation to their oral health and dental treatment needs. The approach of stratified randomization method of sampling was used for the selection of participants. About 240 people with hearing and speech impairments (deaf and dumb) were preferred from four cities of Saudi Arabia, which includes AlKharj, Riyadh, Dammam and Abha. A questionnaire consisting of two sections was distributed among the participants for collecting data. A simple descriptive analysis was performed, and the data were denoted in terms of frequencies and percentages. Microsoft Excel has been worned for compilation of data and execution of graphs. Moreover, the questionnaire data was assessed using SPSS data analysis (IBM SPSS Statistics for Windows, Version 22.0, Armonk, IBM Corp. NY).Result shows that most of the participants were not aware of the importance of oral health. Majority of the participants said that they did not visit qualified dentists in the past and many of them did not aware the right way of doing tooth brushing. Hence, deaf and dumb individuals require basic knowledge about oral health and dental treatment needs. The study concluded that the knowledge level of oral health and dental treatment needs is near to the ground among individuals with hearing and speech impairments (deaf and dumb) in Saudi Arabia.³²

Monika Prasad et al (2018) conducted study to assess dental caries experience, oral hygiene status, periodontal status, and prevalence of malocclusion among differently abled children attending special schools in Delhi. A whole of 1060 (610 males and 450 females), differently abled children were included in the study. The children were splited into visually impaired, hearing and speech impaired and orthopedic physically challenged only. Clinical examination was assessed using Dentition Status and Treatment Need Index and periodontal status recommended by the World Health Organization (WHO), 2013 and examination for malocclusion was made by using Dental Aesthetic Index as described by the WHO Oral Health Survey 1997. To assess the oral hygiene status, the Simplified Oral Hygiene Index introduced by John C Greene and Jack R Vermillion in 1964 was used. Result shows out of 1060 physically challenged children, 56.4% (598) had dental caries with the mean index or decayed, missing, andfilled teeth (DMFT) being 1.10 (standard deviation ± 1.26). It was noted that prevalence of dental caries was elevated in visually impaired group (63.2%) and least in hearing and speech impaired group (51.7%). The overall oral hygiene status recorded was good in 58.5%, fair in 40.8%, and poor in 0.7% of the study population and concluded that the cumulative neglect of oral health was seen among the physically challenged children. Children with visual impairment had much more inferior oral health when compared with hearing and speech impairment and Orthopedically physically challenged group. An improved ease of access to dental services as well as dental health education is necessary to ensure that optimum dental care should reach this special group.³³

KM Shivakumar et al (2018) conducted a study to evaluate the oral health status and treatment needs among 5–12 year old children attending special school in Western Maharashtra, India. A descriptive cross sectional study was performed among 5–12 year old children attending

specials school in Western Maharashtra, India. The study group compiles of 100 children (62 males and 38 females). The oral health status was evaluated by using decayed, missing, and filled teeth (DMFT) index, Community Periodontal Index, Dentition status and treatment needs. Information on disability status, intelligent quotient, and systemic diseases were noted. The mean age of the study population was 9.35 ± 2.92 years. In the study population there were 62 (62%) males and 38 (38%) females. Among the total children viewed, 50% of the children were suffering from mental retardation (MR), followed by MR with cerebral palsy (20%). The overall mean decayed and filled teeth and DMFT scores were 3.53 ± 1.02 and 3.89 ± 1.30 , respectively, and decayed component had the highest score in both the groups. A statistically significant difference has been observed among the gender ($P < 0.001$). There is a high proportion of dental treatment needs required for these children which reflect the barriers to contact and utilize oral health care among these children. As dentist, we should accentuate on health education, periodic recall, and monitoring among these individuals.³⁴

Materials and

Methods

STUDY DESIGN:

A Non Randomized, pre and post interventional study was conducted to assess the effectiveness of oral health education on oral health status among hearing impaired children aged 5-15 years in Madurai city.

STUDY AREA:

Madurai is a major city and cultural headquarters in the state of Tamil Nadu, India.³⁵ For the purpose of administration the city is divided into four zones by the municipal corporation. Madurai West zone, Madurai East zone, Madurai South zone and Madurai North zone.³⁶ Census report of the year 2011 revealed that Madurai district has a population of 30,38,252 up from 25,78,201 in the 2001 census with a growth rate of 17.95%. It had a gender-ratio of 990 females for every 1,000 males. It has a Male literacy of 89.72 and female literacy of 77.16.³⁷

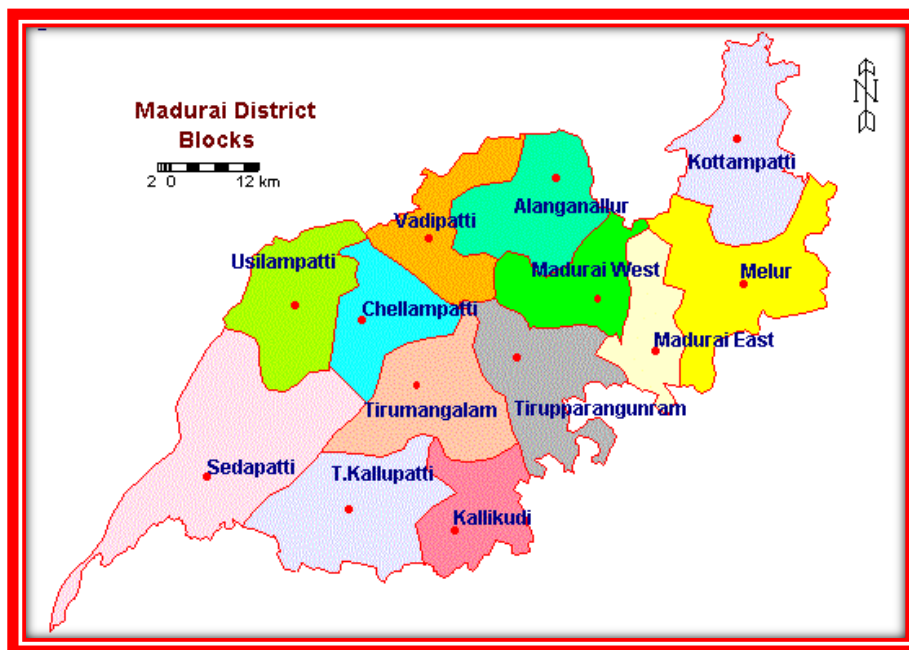


FIGURE 1: MAP SHOWING MADURAI DISTRICT BLOCK³⁸

ETHICAL APPROVAL & INFORMED CONSENT:

The synopsis of the proposed research was prepared and submitted to the Institutional Review Board Best Dental Science College, Madurai. It was reviewed and scrutinized by the board members of the institution and the approval was obtained to conduct the research (Annexure I). Informed consent of parents or school authorities was obtained before the subjects were included in the study (Annexure II). Participation in this study was purely on voluntary basis and they were allowed to opt out from the study at any time, if they wish to do so. It was emphasized that strict confidentiality would be maintained at all times and no names or personal details will be used in the write up of the study.

Obtaining Approval from the Authorities

Several weeks in advance of the scheduled start of the investigation, written permission was obtained from the principal/ Head master/ correspondent of the school indicating the purpose of the study and details of the examination to be conducted. (Annexure III).

Source of Data

The source of data was primary in nature. The Data were collected by using self-structured questionnaire and WHO oral health assessment form for children³⁹ (Annexure IV and V) employing ADA type III examination procedure.

STUDY POPULATION

The study population includes 5 to 15 year old children attending hearing impaired special schools in Madurai city. Madurai city consists of only 2 hearing impaired special schools, all the students studying in these two schools who fulfilled the inclusion criteria were selected in the study. The study was conducted during the period of April 2018 to November 2018.

CRITERIA FOR SUBJECT SELECTION:

INCLUSION CRITERIA:

- Hearing impaired individuals who were diagnosed as hard of hearing and attending special schools for the hearing impairment were included in the study.
- Children aged 5 to 15 years old.
- Children those who were willing to participate.

EXCLUSION CRITERIA:

- Children with physically/ mentally challenged or any other systemic diseases.
- Individuals who were absent from school for a long period.
- Children whose parents denied their participation.
- Children undergoing orthodontic treatment.

SAMPLE SIZE:

A total of 265 (5- 15 yr old) children were studying in the selected schools. Among them 217 subjects participated in the study after excluding 44 children who were not willing to participate in the study, 2 children undergoing orthodontic treatment and 2 children absent for long period.

TRAINING AND CALIBRATION EXERCISES

Training exercises were first carried out in the Department of Public Health Dentistry, Best Dental Science College and Hospital, Madurai on the out-patients under the guidance of a trained person. About twenty subjects were examined to assess the consistency of inter and intra-examiner reproducibility. Inter and Intra examiner reliability was determined using Cohen's Kappa coefficients and the values were 0.93 and 0.92 respectively. The agreement for most

assessments was 90%. Initial training and calibration of the examiners was followed by a pilot study to check for the feasibility.

PILOT STUDY:

A pilot study was conducted on 30 children to assess the feasibility of the study and to pre-test the questionnaire. The clarity of questionnaire and the time required to complete the assessment form was noted in the pilot study.

QUESTIONNAIRE:

The questionnaire consisted of demographic information which includes case number, name, age, gender, date of birth, and place of birth, phone number and residential address. The questionnaire consisted of 20 oral health related questions which were based on knowledge, attitude and practices among disabled children.

FACE/CONTENT VALIDITY:

Face validity of the questionnaire was tested by an expert panel (from the Department Of Public Health Dentistry) and was modified in accordance with their recommendations to ensure comprehensive ability. A pilot study was carried out with 30 subjects in order to test items' understandability and the content validity. Information collected from these study participants were used to make final refinements to the questionnaire. The level of missing data was used as an indicator of inappropriate worded questions and those questions were re-framed accordingly.

INTERNAL CONSISTENCY (RELIABILITY):

The questionnaire was constructed in English and separate Tamil translations were later made, which were then back translated to English to ensure the accuracy of the translation and both the translations were done by expert in both language. The Tamil translated questionnaire

was used in the study. The internal consistency was assessed by Cronbach's α . The results of the pilot study showed a good consistency with α values higher than 0.9.

STUDY PROCEDURE:

The selected schools were approached on a scheduled day and data were collected using (a) self administered questionnaire, (b) clinical examination.

Questionnaire was used to record demographic details and knowledge, attitude and practice of oral health among study participants.

Clinical examination (Type III, ADA Specification⁴⁰) was performed by the principle investigator. The average time taken for clinical examination for each child/ subject was 15- 20 minutes. The principle investigator examined about eighteen children per day. Baseline data was collected using questionnaire and WHO oral health assessment form for children, 2013.

The oral health education tool was formulated based on the assessment of oral health knowledge, attitude and practice and oral health status of the study subjects. Oral health education was delivered at different sessions in the respective institutions. To evaluate the effectiveness of the health education, oral examination was carried out at 2 different intervals, one at 3 months and 6 months from the baseline to assess oral health status using WHO oral health assessment form for children, 2013. All the examination was performed by the same examiner.

COMPONENTS OF THE INVESTIGATION

Base line data collection:

1. Questionnaire:

A closed ended, self administered questionnaire was administered to the children 1 day prior to the clinical examination and each participant was providing 30 minutes to complete the

questionnaire. The Principle investigator had a detailed discussion with the teachers before the session regarding the questionnaire and sought their co-operation to help the children to complete the questionnaire. The information pertaining to knowledge, attitude and practice towards oral health of 5- 9 years age group was collected from the caregivers/ parents. (Annexure IV)

2. Clinical Examination:

According to ADA specification Type III Clinical examination was carried out using modified WHO Oral Health Assessment children Form (2013). Clinical examinations were carried out by a single calibrated examiner at the schools during the working days in working hours. Data were recorded by the assistant was sit close to the examiner for better audibility and communication. Subjects who were absent at the time of the first examination were seen at later dates. Children were made seated on office chair under natural daylight. No artificial dental illumination was used. The examinations were carried out by using a number 4 plane dental mouth mirror, dental tweezer and a specially designed lightweight CPI probe with a 0.5 mm ball tip having black band between 3.5 and 5.5 mm and 8.5 and 11.5 mm from the ball tip.

a. WHO oral health assessment form (2013)

The WHO form for oral health assessment of child (2013) was used for the assessment of oral health of the participants. General information, extra oral examination including TMJ assessment and intraoral examinations were done for all the participants. The intraoral examination includes examination of oral mucosa, enamel opacities/ hypoplasia, dental caries, dental fluorosis, dentition status, and periodontal status (gingival bleeding scores).

3. Health education:

Health education is considered to be a one of the primary level of prevention and considered to be cost effective. Based on the baseline data, oral health education model was designed by the investigator himself and it was imparted to the students. Along with oral health education video, demonstration of brushing method to children was given in small groups. The health education video was made for the duration of 8 minutes 30 seconds in Indian Sign Language with Tamil subtitles. The video covered 1) anatomy and functions of tooth 2) causes, progression and prevention of dental caries 3) causes, progression and prevention of gingival disease 4) effects of tobacco consumption 5) diet 6) importance of oral health practices required to maintain it and 7) brushing technique.

a. Demonstration of brushing method:

Brushing method (Fone's technique for age group of 5- 12 years and modified Bass technique for 13- 15 years) was demonstrated separately forming small groups. Children were encouraged to ask queries pertaining to brushing method and such queries were sorted/ cleared in same session. Each group discussion lasted for 10 minutes. After each session, randomly one or two children were picked and were asked to demonstrate the brushing technique which was taught. Playing the health education video and brushing method demonstration was conducted second Friday of every month as a reinforcing programme to the children.

2nd Data collection: (at 3rd month after baseline):

3 months from the baseline data, the 2nd data were collected by using clinical examination procedure following the same criteria as mentioned earlier.

3rd Data collection: (at 6th month after baseline):

6 months from the start of the study, the 3rd data were collected by using clinical examination along with the questionnaire following the baseline criteria.

ARMAMENTARIUM:

The following instruments were used for the study:

1. Plane mouth mirrors- number 4
2. WHO probes
3. Tweezers
4. Gauze
5. Sterilized cotton rolls
6. Kidney trays
7. Disposable gloves
8. Disposable mouth masks
9. Korsolex solution
10. Hand Sanitizer
11. WHO proforma and questionnaire
12. Health education material

CROSS INFECTION CONTROL:

An asepsis protocol was developed and strict procedures were followed for infection control. A new set of autoclaved instruments were used for each subject. Sufficient numbers of instruments were carried to the examination site to avoid interruption during the study. Cold sterilization method was followed using Korsolex chemical solution (Glutaraldehyde – 7.0 grams, 6-dihydroxy 2, 5-Dioxahexane – 8.2grams and Polymethylol urea derivatives – 17.6

grams). One part of Korsolex was diluted to nine parts of clean tap water to get 10% solution, into which, pre-rinsed instruments were immersed for a minimum of 30 minutes before being reused, if needed. Used instruments were placed in the disinfectant solution, then washed and drained well before re sterilization. At the end of each day examination, the entire instruments were autoclaved. Gloves were changed before the examination on every subject. The collected wastes during examination were segregated and disposed based on biomedical waste management guidelines.

EMERGENCY CARE AND REFERRAL:

After the examination a brief summary of the findings were explained to the institutional authorities. If a life threatening condition, or a condition that requires immediate attention, was detected during the examination appropriate measures has been taken to refer the case to our institution and proper care had been taken.

STATISTICAL ANALYSIS:

The collected data were entered into excel. The entered data were checked for consistency. Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) IBM SPSS statistics version 23.0. Using this software descriptive statistics like proportions, mean, and standard deviations were calculated. Chi- square test was used to find the significance of cross tabulation of counts of two or more variable. Mann Whitney- U test was used to assess the difference between genders. Kruskal Wallis test was used to assess the difference between age groups. Friedman test was used to assess the difference between before and after health education. Statistical significance was fixed at $p \leq 0.05$.

Photographs

Photograph 1: Armamentarium



Photograph 2: Study setting- YMCA kamak higher secondary school for the hearing impaired



Photograph 3: Study setting- Leonard school for hearing impaired



Photograph 4: Clinical examination



Photograph 5: Clinical examination



Photograph 6: Health education



Photograph 7: Demonstration of brushing technique



Photograph 8: Health education given by visual aids



Results

An interventional study was conducted to assess the effectiveness of oral health education on oral health status among the hearing impaired 5-15 year old institutionalized special children in Madurai City.

Table 1: Distribution of the study subjects according to age, gender, socioeconomic status and location

VARIABLES		Frequency (n)	Percentage (%)
AGE	5-8 Years	59	27.2
	9-12 Years	109	50.2
	13-15 Years	49	22.6
GENDER	Male	151	69.5
	Female	66	30.5
SOCIO- ECCONOMIC STATUS	Upper	1	.5
	Upper middle	38	17.5
	Lower middle	107	49.3
	Upper lower	71	32.7
LOCATION	Urban	41	19
	Periurban	57	26
	Rural	119	55

Table 1 shows the distribution of the study subjects according to age gender, socio-economic status and location. Among the study subjects, majority 109(50.2%) of the participants were belong to 9- 12 years old followed by 59(27.2%) in 5- 8 years old and 49(22.6%) in 13- 15 years age group. The sample consisted of 151 boys (69.5%) and 66 girls (30.5%). Among the total study subjects, majority of the participants were belong to lower middle class 107(49.3%), followed by upper lower class 71(32.7%), upper middle 38(17.5%) and upper class 1(0.5%). Majority of the participants were from the rural area 119(55%), followed by periurban 57(26%) and only 41(19%) were from urban area.

Table 2: Distribution of study subjects into three age groups with respect to gender

Age groups	Male n (%)	Female n (%)
5-8 Years	40(26.5)	19(28.8)
9-12 Years	78(57.7)	31(47)
13-15 Years	33(21.8)	16(24.2)
Total	151(100)	66(100)

Table 2 shows the distribution of study subjects with respect to gender. Majority 78(57.7%) male subjects were belongs to the age group of 9- 12years followed by 40 (26.5%) subjects in 5-8 years and 33(21.8%) subjects in 13-15 years. Among the Female participants, majority 31(47%) subjects were belongs to the age group of 9- 12 years followed by 19 (28.8%) subjects in 5-8 years and 16 (24.2%) subjects in 13-15 years.

Table 3: Responses of the study subjects to questionnaire with respect to knowledge

Sl. No	Questions	Response	Pre health education frequency n (%)	Post health education frequency n (%)
1	Do you know the role of sugar in producing dental decay?	i) Yes	92(42.4)	205(94.5)
		ii) No	98(45.2)	12(5.5)
		iii) Don't know	27(12.4)	0
2	Do soft drinks affect teeth?	i) Yes	183(84.3)	215(99.1)
		ii) No	13(6)	2(.9)
		iii) Don't know	21(8.7)	0
3	Is it possible to prevent oral diseases by brushing, flossing and avoiding sugar?	i) Yes	163(75.1)	178(82)
		ii) No	6(2.8)	3(1.4)
		iii) Don't know	48(22.1)	36(16.6)
4	Do you know using fluoride in toothpaste/powder strengthens teeth?	i) Yes	180(82.9)	217(100)
		ii) No	29(13.4)	0
		iii) Don't know	8(3.7)	0
5	Do you know tobacco causes oral cancer and is harmful to health?	i) Yes	167(77)	211(97.2)
		ii) No	21(9.7)	0
		iii) Don't know	29(13.4)	(2.8)
6	Does the health of mouth and dentition	i) Yes	57(26.3)	187(86.2)
		ii) No	46(21.2)	0

	impact the health of the body?	iii) Don't know	114(52.5)	12.4(13.8)
7	Do you have lessons on teeth and their problems in your text book?	i) Yes	176(81.1)	203(93.5)
		ii) No	10(4.6)	0
		iii) Don't know	31(14.3)	14(6.5)

Table 3 shows the subjects knowledge with respect to factors that are responsible for good oral health. 42.4 % of subjects knew about the role of sugar in producing dental decay and it was increased after the educational intervention to 94.5%. Majority of the respondents (84.3%) knew that soft drinks affect teeth. After the educational intervention, it was increased by 99.1%. 75.1% of the subjects were consider that brushing, flossing and avoiding sugar prevents oral disease which was increased to 82% after 6 months from baseline.

A total of 82.9% participants knew that using fluoridated tooth paste / powder strengthens teeth. After the educational intervention, everyone were aware about the benefits of fluoridated tooth paste/ powder (100%). 77% of the study population were aware about the ill effects of tobacco on oral health and 26.3 % of subjects consider oral health was related to general health which was increased after the educational intervention to 97.2% and 86.2% respectively.

Table 4: Responses of study subjects to questionnaire with respect to attitude

Sl. No	Questions	Response	Pre health education frequency n (%)	Post health education frequency n (%)
1	What do you mean by healthy teeth?	i) White and shiny teeth	150(62.2)	94(43.3)
		ii) Strong and caries free teeth	11(4.6)	58(26.7)
		iii) Don't know	80(33.2)	65(30)
2	Do you think regular dental visits are necessary?	i) Yes	32(14.7)	52(24)
		ii) No	36(16.6)	133(61.3)
		iii) Don't know	149(68.7)	32(14.7)
3	Treatment of toothache is as important as any other organ in the body?	i) Yes	17(7.1)	27(11.2)
		ii) No	87(36.1)	118(49)
		iii) Don't know	137(56.8)	96(39.8)

Table 4 shows the study subject's attitude towards oral health. There was a considerable improvement in the attitude among study subjects after post health education. Subjects considering strong and caries free teeth as healthy teeth was increased from 4.6% to 26.7%. Among the total study subjects, only 14.7% of them considered regular dental visit was important. After the educational intervention, it was increased to 24%. Only 7 % of the study subjects considered treatment of tooth ache was important as any other organ in the body which was increased to 11.2% after the educational intervention.

Table 5: Responses of study subjects to questionnaire related to Practice for maintaining oral health

Sl. No	Questions	Response	Pre health education frequency n (%)	Post health education frequency n (%)
1	Is it necessary to always rinse our mouth with water after each meal to remove food debris?	i) Yes	172(79.3)	209(96.3)
		ii) No	22(10.1)	0
		iii) Don't know	23(10.6)	8(3.7)
2	How often do you visit the dentist?	i) Once in every six months	0	0
		ii) Once in every 12 months	30(13.8)	87(40.1)
		iii) Occasionally	82(37.8)	104(47.9)
		iv) Only when dental problems occur	104(47.9)	26(12.0)
		v) Never visited	1(.5)	0
3	Reasons for visiting a dentist?	i) Tooth decay	165(76)	196(90.3)
		ii) Dental pain	12(5.5)	5(2.3)
		iii) Gum bleeding	39(18.5)	16(7.4)
		iv) Dental check up	0	0

4	How do you generally clean your teeth?	i) Brush	196(90.3)	216(99.5)
		ii) Finger	21(9.7)	1(.5)
		iii) Neem stick	0	0
5	How many times do you brush a day?	i) Once	141(65)	7(3.2)
		ii) Twice	74(34.1)	210(96.8)
		iii) Thrice	2(.9)	0
6	How do you brush your teeth?	i) Up and down	10(4.6)	29(13.4)
		ii) Left to right	53(24.4)	24(11.1)
		iii) Circular	92(42.4)	144(66.4)
		iv) Combination	62(28.6)	20(9.2)
7	How frequently do you change your tooth brush?	i) Within 1-3 month	117(53.9)	126(58.1)
		ii) Within 3-6 month	27(12.4)	75(34.6)
		iii) Within 1 year	14(6.5)	14(6.5)
		iv) Until brush worn out	59(27.1))	2(1)
8	What material do you use to clean your teeth?	i) Tooth paste	189(87.1)	217(100)
		ii) Tooth powder	24(11.1)	0
		iii) Others	4(1.8)	0
9	Do you use dental floss to clean your teeth?	i) Yes	0	0
		ii) No	112(51.6)	216(99.5)
		iii) Don't know	105(48.4)	1(.5)

10	Do you clean your tongue regularly?	i) Yes	155(71.4)	215(99.1)
		ii) No	59(27.2)	2(.9)
		iii) Sometimes	3(1.4)	0

Table 5 shows the study subjects response towards oral hygiene practices. About 79.3% of study subjects consider rinsing of their mouth with water after each meal is necessary which was increased to 96.3% after the educational intervention.

47.9% of the study subjects visited dentist only when they had problems and nearly 50 % of the subjects visited dentist seldomly. 76% of the subjects visited dentist for treating their decayed tooth followed by 18.5% for bleeding gums and very few (5.5%) for dental pain.

Majority (90.3%) of the subjects were using tooth paste and brush to clean their teeth. After the educational intervention, it was increased to 99.5%. At baseline, Majority of subjects used to clean their teeth once a day (65%). After the educational intervention, approximately 97% started brushing their teeth twice daily. Only 42.4% of the subjects brush their teeth in circular motion and it was increased to 66.4% after intervention.

53.9% of the subjects changed their brush frequently whereas 27.1% of the subjects used their brush till they worn out. None of the subjects had the habit of cleaning their teeth with the dental floss. At baseline, 71% had the habit of cleaning their tongue regularly and it was increased after the health education to 99.1%.

Table 6: comparison of Mean scores of knowledge, attitude and practice of study subjects at baseline and after intervention

VARIABLES	Baseline (MEAN ± SD)	After intervention (MEAN ± SD)	p value
Knowledge	4.69±1.507	5.1±0.793	0.026**
Attitude	0.37±0.563	.49±0.578	0.030**
Practice	4.72±1.663	4.98±0.962	0.042**

Table 6 shows that comparison of mean scores of knowledge, attitude and practice among study subjects at baseline and after the intervention. There was a change in knowledge ($p=0.026$), attitude ($p=0.030$) and practice ($p= 0.042$) among study participants was noticed and it was statistically significant at the follow-up.

Table 7: Gender wise distribution of study subjects based on their Periodontal Status at baseline

Gender	Healthy 0	Bleeding 1	Chi-square	p-value
Male	30(13.8)	125(57.6)	119.11	0.00**
Female	18(8.3)	44(20.2)		
Total	48(22.1)	169(77.8)		

Table 7 shows Gender wise distribution of study subjects based on their Periodontal Status. More number of (57.6%) males had gingival bleeding than females (20.2%) and the difference was statistically significant with the p value < 0.05 respectively.

Table 8: Distribution of Periodontal Status according to age groups at baseline

Age groups	Healthy 0	Bleeding 1	Chi-square	p-value
5-8 Years	13(5.9)	51(23.5)	18.908	0.001**
9-12 Years	29(13.3)	97(44.7)		
13-15 Years	6(2.76)	21(9.67)		
Total	44(20.2)	169(77.8)		

Table 8 shows the distribution of the periodontal status according to the age groups. Among the study subjects, participants affected by gingival bleeding was found to be higher 97(44.7%) in 9-12 years, followed by 51(23.5%) among 5– 8 years and 21(9.67%) among 13 to 15 years age group. The difference was found to be statistically significant (p < 0.001).

Table 9: Age group wise distribution of mean DMFT among study subjects at baseline

Age groups (Year)	dt Mean±SD	ft Mean±SD	DT Mean±SD	MT Mean±SD	FT Mean±SD	DMFT Mean±SD
5-8	2.19±.87	0.09±.34	0.22±.42	0.00±.00	1.46±.78	2.53±1.53
9-12	2.20±.81	0.06±.03	0.86±.34	0.00±.00	1.92±.74	2.78±.814
13-15	2.12±.55	0.03±.24	1.07±1.37	0.18±.44	2.02±.80	2.43±1.08
p-value	0.381	0.000**	0.000**	.000**	0.000**	0.014**

Table 9 shows the age group wise distribution of mean DMFT among study subjects. The mean dental caries in primary dentition (dt) was higher in 9-12 years age group with $2.20 \pm .81$ followed by 5-8 years ($2.19 \pm .87$) and 13- 15 years ($2.12 \pm .55$). The mean dental caries in permanent dentition (DT) showed increasing pattern with respect to age groups $0.22 \pm .42$ (5-8 years), $0.86 \pm .34$ (9-12years) and 1.07 ± 1.37 (13-15 years). There was a statistically significant difference between various age groups ($p < 0.000$).

The mean missing tooth due to dental caries in permanent dentition was not observed in age group below 13 years. A mean missing tooth of 0.18 ± 0.44 was observed in age groups of 13- 15 years and it was statistically significant ($p < .000$).

The mean filled tooth in primary dentition (ft) was declining in 5-8 years age group with $0.09 \pm .34$ followed by 9-12 years with $0.06 \pm .03$ and 13- 15 years ($0.03 \pm .24$) where as mean filled component in permanent dentition showed increasing pattern with respect to age groups and the difference between these 3 age groups in primary dentition and permanent dentition were statistically significant with the **p value** < 0.000 .

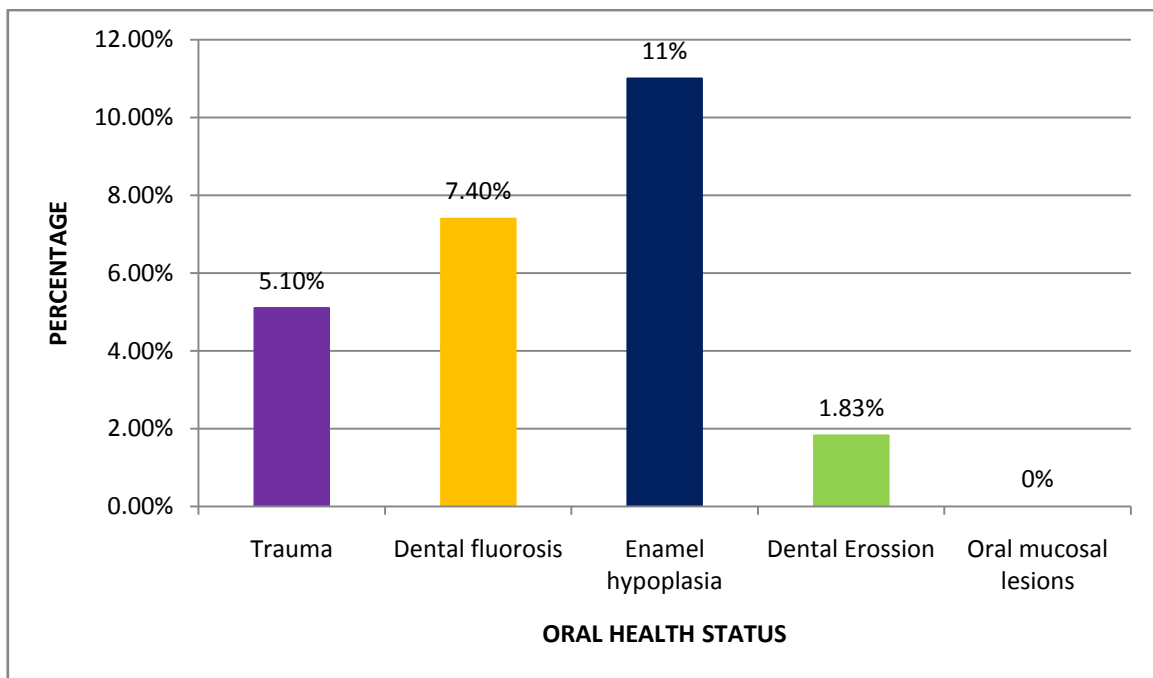
The mean DMFT was higher in 9- 12 years age group with $2.78 \pm .814$ followed by 13- 15 years with 2.43 ± 1.08 and 5- 8 years (2.53 ± 1.53). There was a statistically significant difference between various age groups ($p < 0.014$).

Table 10: Gender wise distribution of mean DMFT among study subjects at baseline

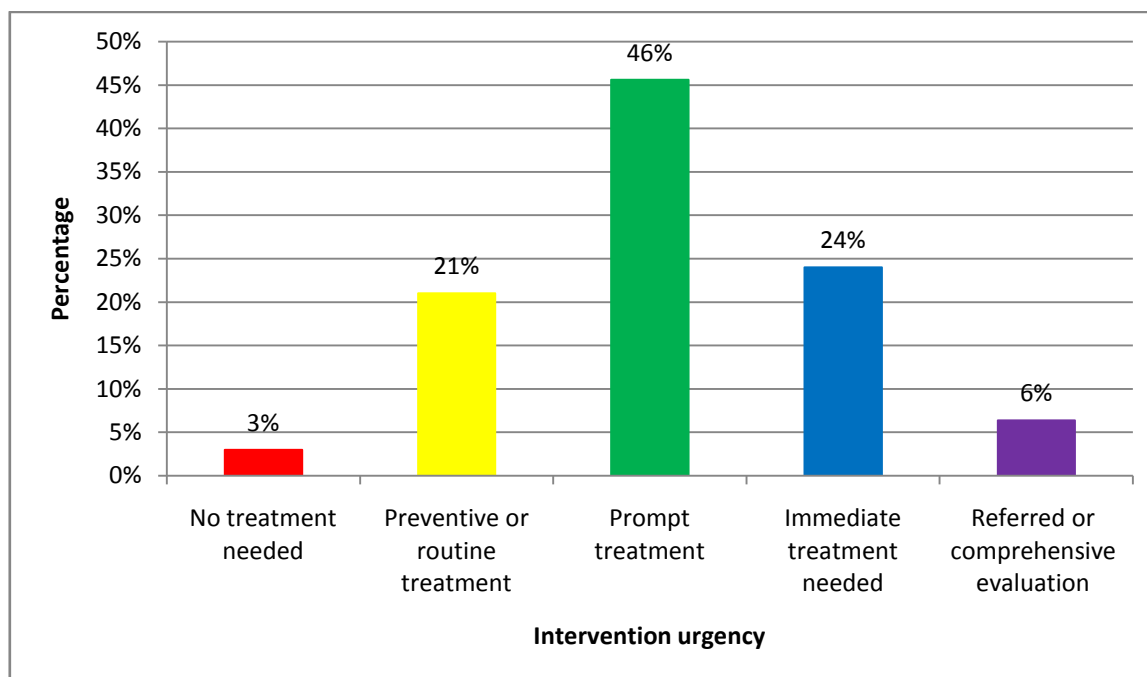
Gender	dt	ft	DT	MT	FT	DMFT
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Male	$1.97 \pm .60$	$0.04 \pm .22$	$0.17 \pm .39$	$0.04 \pm .22$	$2.16 \pm .73$	2.35 ± 1.11
Female	$2.17 \pm .39$	$0.09 \pm .34$	$0.24 \pm .44$	$0.05 \pm .23$	$2.48 \pm .90$	2.74 ± 1.90
p-value	0.045**	0.000**	0.000**	0.016**	0.035**	0.002**

Table 10 shows the gender wise distribution of mean DMFT among study subjects. The mean dental caries, missing tooth and filled tooth was higher in females than the males which was statistically significant with the **p value of 0.000, 0.016 and 0.0035** respectively. Hence the Mean DMFT was higher in Females and it was statistically significant ($p < 0.002$).

Graph 1: Oral Health Status of hearing impaired children aged 5-15 year old



Graph 1 shows the oral health status of a study subjects. Among the study subjects, prevalence of enamel hypoplasia was found to be 24(11%) and overall prevalence of Dental fluorosis was found to be 16(7.4%). The prevalence of trauma and dental erosion was negligent.

Graph 2: Intervention urgency of hearing impaired children aged 5-15 year old

Graph 2 shows the Intervention urgency of hearing impaired children aged 5-15 year old. Among the study subjects, 99 (46%) of the participants needed prompt treatment followed by 52 (24%) of the participants needed immediate treatment, 45 (21%) of participants needed preventive or routine treatment, 14 (6.4%) of the participants needed referred or comprehensive evaluation and only 7 (3%) of the study subjects did not need any treatment respectively.

Table 11: Comparison of Periodontal Status among study subjects at different intervals

VARIABLES	Baseline (MEAN ± SD)	At 3rd month (MEAN ± SD)	At 6th month (MEAN ± SD)	p value
Gingival bleeding	.96±.200	.92±.269	.89±.314	.001**

Table 11 shows that Comparison of Periodontal Status among study subjects at different intervals. The results shows a reduction in gingival bleeding from the baseline (.96±.200) to 6th month (.89±.314) duration among the study subjects which was found to be statistically highly significant with the p value <001.

Table 12: Comparison of Mean caries tooth (dt, DT), filled tooth (ft, FT) and missing tooth (MT) for Primary Dentition and permanent dentition among study subjects at different intervals.

VARIABLES	Baseline (MEAN ± SD)	At 3rd Month (MEAN ± SD)	At 6th Month (MEAN ± SD)	p value
dt	2.16±.784	2.14±.833	2.11±.885	.012**
ft	.05±.259	.08±.308	.10±.332	.000**
DT	.77±.828	.76±.833	.74±.838	.005**
MT	.04±.222	.06±.248	.06±.264	.022**
FT	1.76±.858	1.79±.823	1.82±.793	.017**
DMFT	2.64±.110	2.64±.110	2.64±.110	1.00

Table 12 shows that comparison of Mean caries tooth (dt, DT), filled tooth (ft, FT) and missing tooth (MT) for Primary Dentition and permanent dentition among study subjects at different intervals. There was a gradual declination of decayed component from base line to 6th month in both the primary dentition and permanent dentition where as the filled component of primary and permanent dentition from the baseline to 6th month was inclined. The difference in mean dt, ft, DT and FT was found to be statistically significant at before and after intervention and p value as follows **0.012, 0.000, 0.005** and **0.017**. But the mean DMFT was not found to be statistically significant at before and after intervention.

Table 13: Comparison of Oral Health Status of study subjects at different intervals

VARIABLES	Baseline (MEAN ± SD)	At 3rd Month (MEAN ± SD)	At 6th Month (MEAN ± SD)	p value
Trauma	.05±.220	.05±.220	.05±.210	0.37
Dental Erosion	.02±.135	.02±.135	.02±.135	1.00
Enamel Hypoplasia	.11±.309	.11±.309	.11±.309	1.00
Dental fluorosis	.07±.262	.07±.262	.07±.262	1.00

Table 13 shows that Comparison of Oral Health Status of study subjects at different intervals. There was no change in mean value of Trauma, dental erosion, enamel hypoplasia and dental fluorosis from baseline to 6th month and it was not found to be statistically significant.

Discussion

Oral health and maintenance of good oral hygiene are of great importance for each and every individual. It forms an integral part of overall health and well-being of an individual especially in disabled due to their compromised congenital and medical conditions. People with intellectual disabilities often are not able to express their pain and discomfort. Often they do not have the ability to take care of their oral hygiene independently due to their disabilities. Oral diseases pose a major health problem among these individuals.⁴¹

Children with intellectual and physical disabilities come under population with special needs, These special children have the right to receive same standards of oral health care as normal children but there are evidence that they experience poor oral and general health.² The oral problems in disabled people has been attributed to lack of awareness about oral hygiene measures, an inability to access oral care facilities, diet, eating patterns, medication, physical limitations and attitudes of parents and care providers, all of which contribute to poor oral health.² The prevalence of dental disease and its severity are higher among disabled children when compared with general population.

About 15% of the world's population lives with some form of disability, of whom 2-4% experience significant difficulties in functioning. According to the census of India 2011 about 2.21% of the total population suffers from a disability. Physical disability tops the chart amounting to 20.3% followed by hearing impairment 18.9%, visual impairment 18.8% and mentally retarded 5.6%.⁴² In poor societies, many disabled persons find it difficult to survive because nutritional status is very low and services are often inadequate and hence disabled people live in extreme poverty, misery and despair, leading to dependency and deprivation.²

Poor oral cleanliness and periodontal health have been observed in children with disabilities. It may be related to the low physical abilities of these children leading to difficulties in tooth brushing.⁴³

Hence the aim of this study was to evaluate the effectiveness of oral health education program on oral health status among hearing impaired special children aged 5- 15 year in Madurai city. To our knowledge, this was the first comprehensive interventional study conducted among hearing impaired special children in Madurai city. It was hoped that this study would provide data for the health care providers in implementing oral health promotion programs for the hearing impaired special children.

In the current study, 217 subjects were included. Among them 69.5% were males and rest were females and this is similar to the study carried out by Pradhan M et al (70.4% males)³, Jain M et al (76.8% males)² and Reddy VK et al(72.6% males)¹⁰ respectively. The variation in number of study subjects and reason for small sample size in the current study may be attributed to the fact that the 11% of the females and (9%) of the males do not attend the special schools.⁴⁴

The study subjects had a good knowledge about oral health. Almost 57.6% of the subjects did know the role of sugar in producing dental caries and it was increased after the health education that is about 73%. This could be due to a socio- economic background, education level and awareness towards oral health among their parents. Hence the oral health media for the hearing impaired subjects is very much needed to enhance their access to oral health information. On the assumption that health education, a quantum leap was observed in the overall knowledge of the study subjects.

At baseline, the study subjects considered white and shinny teeth as healthy teeth (62.2%) and lacks the awareness about regular dental visits (80%). Majority (85%) of them thought that treatment of tooth ache was not important as any other organ in the body. This could be due to the lack of knowledge among the family members and caregivers and also could be the communication barriers and difficulty of the special children to comprehension and understand the message conveyed.

The oral hygiene practice revealed that more than 90 % of the participants were using tooth brush and tooth paste to clean their teeth which was in line with the study conducted by Pradhan M et al ³, Purohit BM et al (99.6%) ⁷, Suma G et al (93.7%) ⁹ and Hamad AM (100%) ²⁰. There was the slight increase in (9%) number of the subjects using tooth brush and paste after the health education intervention, removing of plaque from the teeth is a skill. Since the hearing impaired individual may not understand and respond the instructions of oral hygiene practices. Many disabled individuals may find the maintenance of oral hygiene more difficult than the normal children. The present study showed improvement in gingival condition at 3rd month and 6th month interval, this change in gingival status may be due to intensified reinforcement of daily brushing by the investigator.

65% of the participants brushed their teeth once daily and 34.1% brushed twice a day. This was in agreement with a study conducted by Prathan M et al where 54% of the participants brushed once a day and 34.9% of the participants brushed twice a day. ³ In a study conducted by vichayanrat et al, where 86.8% of the participants brushed twice a day which is in contrast to the results of the current study. ¹⁸ The variation may be due to the age groups, knowledge and socio economic status of study subjects.

4.6% of the study subject practising vertical method of brushing at baseline. This was contradicted to a study conducted by Hamad AM et al, where 52% of the participants used vertical technique of brushing. ²⁰ This difference could be due to the practices taught by their caregivers/ parents. After the educational intervention, it was increased that 66% of the study subjects who started brushing by vertical method.

None of the participants in the present study visited dentist in last six months. Similar study conducted by Suma G et al shows that majority of the participants had never visited to a dentist for regular check up or treatment. ⁹

The result of periodontal status showed bleeding in 77.8% of the participants. Age wise comparison of periodontal status showed that subjects affected by gingival bleeding were high in 9- 12 years old followed by 5-8 years old and 13- 15 year old which was found to be statistically significant. This was consistent with a study conducted by Sandeep V et al in Bhimavaram, India in the year 2016 which showed that oral hygiene performance in their children was compromised.²⁴ Clearly many disabled individual will discover the upkeep of their own oral hygiene substantially more troublesome than normal individual in light of the fact that those with hearing impairment can't comprehend and react to the directions given and ace the procedure of oral hygiene practises.

After the educational intervention, mean gingival bleeding was declined in the study subjects. This may be attributed to the fact that the improvement in oral hygiene practices among the subjects after repeated intervention.

The prevalence of caries among study subjects was 94%. This was similar to the study conducted in 5-12 year old children in Sofia showed that caries prevalence was up to 89%. In India, the caries prevalence among hearing impaired young adults investigated was 93.33%. Few other studies showed prevalence of dental caries ranging from 82% to 96% such as Vichayanart T et al (82.5)¹⁸, Al-Qahtani Y et al (93%)³⁰. Dental caries is considered to be a multi-factorial disease and it may develop at any aged individual, group (or) community. The main reason for higher prevalence of dental caries may be neglected and could be attributed to lack of preventive advice in the areas of diet and oral hygiene. Persons with the health needs may also face barriers in obtaining dental care compared to others.

Mean DMFT score for the study subjects was 2.64 ± 1.110 . The mean DMFT was higher in 9- 12 years old with the mean of 2.78 ± 0.814 and the mean DMFT score increases with advancing age. This finding was similar to other studies conducted among hearing

impaired special children such as Jain M et al ³, Suma G et al ⁹, Sandeep V et al ²⁴ and Bharadwaj et al ¹⁹. DMFT scores expanded with increment in age. The largest segment was the decayed part in both the studies. This similarity might be because of equivalent in study age groups and health care delivery system in both the areas (India).

With respect to gender the mean DMFT (2.74 ± 1.90) of female subjects was higher than males (2.35 ± 1.11) subjects showing statistically significant difference. Similar study conducted by Rawlani S et al in India showed caries experience among females (2.52 ± 1.75) was found to be higher than in the males (2.41 ± 1.45). According to Lukacs JR (2006), Higher caries prevalence among females is regularly clarified by one of three variables: 1) Early eruption of teeth in girls, thus longer introduction of girls teeth to the cariogenic oral condition, 2) less demanding access to sustenance supplies by females and continuous eating amid nourishment planning, and the study resulted that hormonal changes can dramatically affect the oral health of females, and comprise an essential causal factor in clarifying sex contrasts in caries rates. ⁴⁵

The higher scores of DMFT may be due to lack of awareness and knowledge about oral health and its link with general health. The lack of preventive care and restoration also suggests that the oral health is a neglected entity and though only considered when it reaches end stage. One of the major reasons for this attitude could be majority of the study subjects belong to low socio- economic status which is directly related with higher prevalence of dental caries. ²²

On analysing the component parts of the dft / DMFT, the decay component formed the major component of the index, while the filled components and missing components contributed megerely. This finding was in consistent with other similar studies conducted by Jain M et al ², Sanjay V et al ⁸. The reason for negligible (f) filled component among the

hearing impaired special children may be due to lack of motivation, low level of awareness, difficulties in accessing oral health care, negligence on the part of caregivers and cost of treatment highlighting the neglected section of the society.

After the educational intervention, surprisingly there was inclined in filled component and no change in decayed component of study subjects after 6 months. The change in this component may be because of periodic reinforcement have made the subjects get treated for their affected teeth.

CONCLUSION

An interventional study was undertaken to assess and compare the effectiveness of oral health education on oral health status among the hearing impaired 5-15 years old institutionalized special children in Madurai city.

1. The prevalence of caries was more in the hearing impaired population amounting to 94% and the overall prevalence of enamel hypoplasia was less at 11%.
2. The overall prevalence of dental fluorosis and trauma was less with the prevalence rate of 7.40% and 5.10% respectively.
3. The overall mean DMFT and mean dft scores were 2.64 and 2.21 respectively. The largest component of dft was the d, with the mean of 2.13, and the f component of 0.07 was far lower.
4. At baseline, the mean DMFT and dft scores were 2.64 and 2.21 respectively. At the end of 3 months and 6 months, there was no significant difference was seen in DMFT and dft at different time interval.
5. At the baseline, the mean gingival bleeding was .96. At the end of 3rd month and 6th month, there was a significant decrease in of gingival bleeding.
6. The difference in the knowledge, attitude and practice of the children was statistically significant after health education ($p < 0.05$).

Hence we can conclude that health education is beneficial in improving oral hygiene of the hearing impaired children. The oral health education model proved to be an effective tool to instill good oral hygiene practice in these children. The research showed that by means of an appropriate programme with close monitoring and periodic dental check-ups, the knowledge on oral health and oral hygiene of hearing impaired children could be improved.

In India and in many other developing countries, the academic curriculum of dentists does not train them to treat these children. So there is an immediate need to make dental

practitioners and dental students aware of the special problems posed by these children and to provide sufficient training, if any dental health programmes for the rehabilitation of these special children are to be attempted. The oral health care of these children should be approached jointly with general health care in order to achieve a more holistic view of the individual's physiological and psychological wellbeing.²

The limitation of the present study is small sample size; since the study was restricted to the institutionalized children. Hence the result could not be generalized to the entire Madurai city. Children at ages 5- 15 years differ in their cognitive ability and normal dexterity to perform tooth brushing. The motivation of young children differs from that used for 15 years old with more developed cognitive abilities which also explain the limitation of the study. As tooth brushing is a fine motor activity, younger children cannot perform it effectively without assistance. No attempts were made to educate, train and involve caregivers, teachers or parents throughout the study.

Recommendations

The poor oral health of the hearing impaired special children surveyed in this study is due to poor oral health care and the attitude and lack of awareness among the children in these institutions to overcome these problems. It is suggested that:

1. Primary prevention approaches should be taught to the individual children of institutions
2. Coordinated efforts should be made by the medical, dental, and social services to serve their needs. Individualized recall visits should be introduced to schools by dental teams to perform preventive and curative measures, particularly for those at a high risk of caries and periodontal diseases.
3. Campaigns should be launched to decrease dental disease, through changing the school diet to limit cariogenic intake and advocating public health programs.
4. Pit and fissure sealants should be applied to the permanent molars and premolars soon after eruption and parents should be advised the importance of regular monitoring and maintenance of these fissure sealants.
5. The children should be given suitable toothbrushes and fluoride toothpaste. In areas of enamel decalcification, fluoride varnish should be applied for children with poor tolerance with dental procedures.
6. Regular school-based programmes of tooth brushing should be implemented and reinforced in all these groups with disabilities. Children should be instructed to clean their teeth twice a day and oral hygiene should be practiced at school and supervised by teachers.
7. Educational institutions should include oral health as part of training or socialization programmes.
8. Positive links between educational institutions and dental services should be established to promote the oral health of children with disabilities. To enhance oral

health outcomes, advanced training is recommended for dental providers, dental hygienists, the staff of schools and other persons working in health care systems.

9. A national epidemiological survey should be conducted by experts in public dental health, in order to prepare and implement a long-term public dental health care plan.
10. The efficacy of the implementation of this plan should be evaluated subsequently in terms of the oral health of the recipients.
11. Further longitudinal studies involving teachers of the special schools, caretakers, and parents regarding oral health education of these children are necessary.

References

1. Sandeep V, Vinay C, Madhuri V, Rao VV, Uloopi KS, Sekhar RC. Impact of visual instruction on oral hygiene status of children with hearing impairment. *Journal of Indian Society of Pedodontics and Preventive Dentistry*. 2014 Jan 1;32(1):39.
2. Jain M, Bharadwaj SP, Kaira LS, Bharadwaj SP, Chopra D, Prabu D, Kulkarni S. Oral health status and treatment need among institutionalised hearing-impaired and blind children and young adults in Udaipur, India. A comparative study. *Oral Health Dent Manag*. 2013 Mar;12(1):41-9.
3. M, Pradhan & U, Joshi & S, Poudyal & P, Dixit & Sagtani, Reshu & D, Pradhan. (2015). Oral health status of Deaf and Hard of Hearing people associated with two centers in Kathmandu, Nepal..
4. <https://www.who.int/news-room/fact-sheets/detail/deafness-and-hearing-loss>
(last accessed on 12/5/2018)
5. Kumar S, Dagli RJ, Mathur A, Jain M, Duraiswamy P, Kulkarni S. Oral hygiene status in relation to sociodemographic factors of children and adults who are hearing impaired, attending a special school. *Special Care in Dentistry*. 2008 Nov;28(6):258-64.
6. Garg S, Chadha S, Malhotra S, Agarwal AK. Deafness: Burden, prevention and control in India. *Natl Med J India*. 2009 Mar 1;22(2):79-81.
7. Purohit BM, Singh A. Oral health status of 12-year-old children with disabilities and controls in Southern India. *WHO South-East Asia journal of public health*. 2012 Jul 1;1(3):330.
8. Sanjay V, Shetty SM, Shetty RG, Managoli NA, Gugawad SC, Hitesh D. Dental health status among sensory impaired and blind institutionalized children aged 6 to 20 years. *Journal of international oral health: JIOH*. 2014 Feb;6(1):55.

9. Suma G, Das UM, Akshatha BS. Dentition status and oral health practice among hearing and speech-impaired children: A cross-sectional study. *International journal of clinical pediatric dentistry*. 2011 May;4(2):105.
10. Reddy VK, Chaurasia K, Bhambal A, Moon N, Reddy EK. A comparison of oral hygiene status and dental caries experience among institutionalized visually impaired and hearing impaired children of age between 7 and 17 years in central India. *Journal of Indian society of pedodontics and preventive dentistry*. 2013 Jul 1;31(3):141.
11. Mitsea A, Karidis A, Donta-Bakoyianni C, Spyropoulos N. Oral health status in Greek children and teenagers, with disabilities. *Journal of clinical pediatric dentistry*. 2002 Sep 1;26(1):111-8.
12. Barnett S. Communication with deaf and hard-of-hearing people: a guide for medical education. *Academic Medicine*. 2002 Jul 1;77(7):694-700.
13. Al-Qahtani C, Wyne AH. Caries experience and oral hygiene status of blind, deaf and mentally retarded female children in Riyadh, Saudi Arabia. *Tropical dental journal*. 2004 Mar:37-40.
14. Rao D, Amitha H, Munshi AK. Oral hygiene status of disabled children and adolescents attending special schools of South Canara, India. *Hong Kong Dent J*. 2005 Dec;2(2):107-2.
15. Dao LP, Zwetchkenbaum S, Inglehart MR. General dentists and special needs patients: does dental education matter?. *Journal of Dental Education*. 2005 Oct 1;69(10):1107-15.
16. Petrou S, McCann D, Law CM, Watkin PM, Worsfold S, Kennedy CR. Health status and health-related quality of life preference-based outcomes of children who are aged 7 to 9 years and have bilateral permanent childhood hearing impairment. *Pediatrics*. 2007 Nov 1;120(5):1044-52.

17. Rawlani S, Rawlani S, Motwani M, Bhowte R, Baheti R, Shivkuma S. Oral health status of deaf and mute children attending special school in Anand-Wan, Warora, India. *Journal of Korean Dental Science*. 2010;3(2):20-5.
18. Vichayanrat T, Kositpumivate W. Oral health conditions and behaviors among hearing impaired and normal hearing college students at Ratchasuda College, Nakhon Pathom, Thailand. *Southeast Asian Journal of Tropical Medicine and Public Health*. 2014 Sep 1;45(5):1228.
19. Bhardwaj VK, Fotedar S, Sharma KR, Luthra RP, Jhingta P, Sharma D. Dentition status and treatment needs among institutionalized hearing and speech impaired children in Himachal Pradesh in India: A cross-sectional study. *SRM Journal of Research in Dental Sciences*. 2014 Apr 1;5(2):78.
20. Hamad AM, Ali SH, Arif AN, Zardawi FM. Oral Health Status of Deaf Persons in Sulaimani city-Iraq.
21. Doichinova L, Peneva M. Prevalence of dental caries in hearing impaired children than 5 to 12 years old in Sofia. *Int J Sci Res*. 2015;4:1088-91.
22. Mariam A H Khalaf; Kamal E M El-Motayam; Randa Y Abd El-Gawad and Abir A Omara. Oral Health Knowledge and Attitude of Caregivers and Oral Health Status of Children with Hearing Impairment. *J Am Sci* 2015;11(5):73-80.
23. Suhani RD, Suhani MF, Badea ME. Dental anxiety and fear among a young population with hearing impairment. *Clujul medical*. 2016;89(1):143.
24. Sandeep V, Kumar M, Vinay C, Chandrasekhar R, Jyostna P. Oral health status and treatment needs of hearing impaired children attending a special school in Bhimavaram, India. *Indian journal of dental research*. 2016 Jan 1;27(1):73.
25. Jnaneswar A, Subramaniya GB, Pathi J, Jha K, Suresan V, Kumar G. Assessment of dental caries and periodontal status in institutionalized hearing impaired children in

- Khordha District of Odisha. Journal of Indian Society of Pedodontics and Preventive Dentistry. 2017 Jul 1;35(3):203.
26. Yanti GN, Alamsyah RM, Natassa SE. Effectiveness of dental health education using cartoons video showing method on knowledge and oral hygiene of deaf children in Yayasan Karya Murni Medan.
27. Shivakumar KM, Patil S, Kadashetti V. Oral health status and dental treatment needs of sensory-impaired children of Satara district, India. Journal of International Oral Health. 2017 Sep 1;9(5):197.
28. TRENTIN MS, COSTA AA, BARANCELLI M, Marceliano-ALVES MF, MIYAGAKI DC, CARLI JP. Prevalence of dental caries in patients with intellectual disabilities from the Association of Exceptional Children's Parents and Friends of Southern Brazil. RGO-Revista Gaúcha de Odontologia. 2017 Dec;65(4):352-8.
29. Yadav OP, Shavi GR, Panwar M, Rana S, Gupta R. Prevalence of Dental Caries and Periodontal Disease in Deaf and Mute Children Attending Special Schools in Jaipur City, Rajasthan. J Dent Health Oral Disord Ther. 2017;7(4):00252.
30. Al-Qahtani Y, Al-Naser H, Al-Nahawi D, Al-Tuwaijri F, Al-Abdullatif M, Al-Jewair T. Dental Caries Prevalence and Severity among Deaf and Hearing Impaired Male Students in Eastern Saudi Arabia.
31. Gadiyar A, Gaunkar R, Kamat AK, Tiwari A, Kumar A. Impact of oral health-related behaviors on dental caries among children with special health-care needs in Goa: A cross-sectional study. Journal of Indian Society of Pedodontics and Preventive Dentistry. 2018 Jan 1;36(1):33.
32. Mustafa M, Asiri FY, AlGhannam S, AlQarni IA, AlAteeg MA, Anil S. Extent of awareness regarding oral health and dental treatment needs among individuals with

- hearing and speech impairments in Saudi Arabia. *Journal of International Society of Preventive & Community Dentistry*. 2018 Jan;8(1):70.
33. Prasad M, Patthi B, Singla A, Gupta R, Niraj LK, Ali I. Special care with special child-oral health status of differently abled children attending special schools in Delhi: A cross-sectional study. *Journal of Indian Association of Public Health Dentistry*. 2018 Apr 1;16(2):137.
34. Shivakumar KM, Patil S, Kadashetti V, Raje V. Oral health status and dental treatment needs of 5–12-year-old children with disabilities attending special schools in Western Maharashtra, India. *International Journal of Applied and Basic Medical Research*. 2018 Jan;8(1):24.
35. <https://en.wikipedia.org/wiki/Madurai> (Last accessed on 19/12/2018)
36. https://en.wikipedia.org/wiki/Geography_of_Madurai (Last accessed on 19/12/2018)
37. https://en.wikipedia.org/wiki/Madurai_district (Last accessed on 19/12/2018)
38. <http://www.madurai.tn.nic.in/block.html> (Last accessed on 19/12/2018)
39. World Health Organization: Oral health surveys: basic methods. World Health Organization: 2013.
40. Thompson NJ, Boyer EM. Validity of oral health screening in field conditions: pilot study. *American Dental Hygienists Association*. 2006 Apr 1;80(2):9-.
41. Rao D, Amitha H, Munshi AK. Oral hygiene status of disabled children and adolescents attending special schools of South Canara, India. *Hong Kong Dent J*. 2005 Dec;2(2):107-113.
42. http://www.who.int/disabilities/world_report/2011/report/en/ (Last accessed on 19/12/2018)

43. Solanki J, Gupta S, Chand S. Comparison of dental caries and oral hygiene status among blind school children and normal children, Jodhpur City Rajasthan, India. *Universal Research Journal of Dentistry*. 2014 Jan 1;4(1):22-25. 53.
44. http://mospi.nic.in/sites/default/files/publication_reports/Disabled_persons_in_India_2016.pdf (last accessed on 03/01/2019)
45. Lukacs JR, Largaespada LL. Explaining sex differences in dental caries prevalence: saliva, hormones, and “life- history” etiologies. *American Journal of Human Biology: The Official Journal of the Human Biology Association*. 2006 Jul;18(4):540-55.

Annexures



INSTITUTIONAL ETHICAL COMMITTEE

Best Dental Science College and Hospital

Ultra Nagar, Madurai - 625 104.

RECOGNIZED BY DENTAL COUNCIL OF INDIA, NEW DELHI
AFFILIATED TO THE TAMILNADU Dr. M.G.R MEDICAL UNIVERSITY, CHENNAI.

IRB/IEC Reference No: 2016-STU-BrVII-PKR-24

CHAIRPERSON

Dr. S. Jayachandran, MDS, Ph.D, MAMS,
MBA

MEMBERS

Dr. A. Babu Thandapani, M.Pharm, PhD

Dr. R. Sathyanarayanan, MDS

Dr. M. Senthil, MDS

Mrs. V. Divyadarshini, MSc

Dr. K.S. Premkumar, MDS

Dr. K. Prabhu sankar, MDS

Dr. Bharathkumar, MDS

Dr. P. Hemalatha, MDS

Dr. C.R. Murali, MDS

Prof. Mr. M. Pandi Kumar

Mr. V. Chinnakarupian, MA BL, DCFSc

PRINCIPAL

Dr. Vijayalakshmi. K, MDS

MEMBER SECRETARY

Dr. Sudarshan.R, MDS

Project title: Assessment of oral health status and effectiveness of an oral health education program in 5-15 year old hearing impaired special children – An interventional study, Madurai

Principal Investigator: Dr. P.Premkumar, PG student

Review: New/Revised/Expedited


Date of Review: 27/09/2016

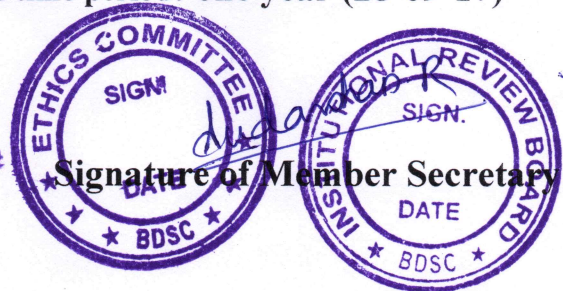
Date of previous review, if revised application:

Decision of the IEC/IRB:

- Provisional approval to conduct the study is being given
- The results of this study, along with summary are to be submitted for obtaining final approval

Recommended time period: one year (28-09-17)


PRINCIPAL
BEST DENTAL SCIENCE COLLEGE
MADURAI-625104



Signature of Member Secretary

NB:

- Inform IRB/IEC immediately in case of any issue(s)/adverse events
- Inform IRB/IEC in case of any change of study procedure, site and investigator
- This permission is only for the period mentioned above
- Annual report to be submitted to IEC/IRB
- Members of IEC/IRB have right to monitor the trail with prior intimation

PATIENT INFORMATION FORM

PARTICIPANT'S NAME:

I am DR.PREMKUMAR. P postgraduate student from the Department Of Public Health Dentistry Of Best Dental Science College And Hospital. I am conducting a research to *“assessment of oral health status and effectiveness of an oral health education program in 5- 15 years old hearing impaired special children- an interventional study, madurai”*The research procedure will involve personal data collection, questionnaire data collection and imparting oral health education in visual aids. The questionnaire will contain questions related to oral hygiene practices, knowledge and attitude towards it. In the course of my research I will be examining the oral cavity of the children and giving oral health education at 1st month, 3rd month and 6th month. During each visit your child will be expected to stay with me for 5- 10 minutes. In the health education I will be educating how to maintain oral hygiene. The children will benefit from the research by way of improvement in their oral hygiene and improvement in knowledge and better attitude towards the maintaining of oral health. In general there will be no side effects, as the study group will not be administered any drugs. In additional to the personnel benefits of the children, the research will help to formulate different ways to impact the knowledge of oral hygiene in order to improve the attitude and practice of many other visually impaired children in the society at large.

You will be given complete information about the research and you are requested to permit your children to be a part of the research. I shall take the time to make myself clear with the explanation of the intention and the steps involved in the study. You do not have to decide immediately about your child to participate in the study. You may decide about your child to participate in the research after talking to anyone with whom you are comfortable, about the research. Hereby I assure you that the details obtained during the course of the study will be kept confidential with regard to individual identity. At no time will your name be reported along with your responses. All data will be reported in group form only.

If you are not interested in your child to continuing in the research or if you feel uncomfortable, you can withdraw your child or refuse their participation in the research at any time.

Name and address of the investigator:

Dr. Premkumar. P

Post graduate student,

Department of public health dentistry,

Best dental science college and hospital,

Madurai.

BEST DENTAL SCIENCE COLLEGE AND HOSPITAL, MADURAI

DEPARTMENT OF PUBLIC HEALTH DENTISTRY

STUDY TITLE: Assessment of oral health status and effectiveness of an oral health education program in 5- 15 years old hearing impaired special children- an interventional study, Madurai.

INVESTIGATOR:

Dr. Premkumar. P

Post Graduate Student

GUIDED BY:

Dr.Bharath kumar garla., M.D.S.,

Head Of The Department

INFORMED CONSENT FORM

NAME:	ADDRESS
SEX: MALE/FEMALE	
AGE: YEARS	PHONE NUMBER

I have been informed about the purpose, procedure, period of the study and the benefits in the language that I understand in a comprehensible manner. I have fully understood the procedure and I hereby give my unconditional consent for the participation of my child/wardin the above mentioned research to be conducted in the school.

Address &Phone No:

Signature :

(Parent/Guardian)

Investigator's signature:

Date:

Date: 06.06.2018

From,

Dr. P. Premkumar,

III year postgraduate student,

Department of Public Health Dentistry,

Best Dental Science College And Hospital,

Madurai-625104.

Through,

Dr. Umesh, M.D.S.,

Professor and Head of the Department,

Department of Public Health Dentistry,

Best Dental Science College and Hospital,

Madurai-625104.

To,

The General Secretary,

Young Mens Christian Association (YMCA)

Main Guard Square,

Nethaji Road,

West Avani Moola Street,

Madurai-625001

Respected Madam,

SUB: Request to provide permission to conduct my Research work titled "Assessment of oral health status and effectiveness of an oral health education program in 5-15 years old hearing impaired special children- an *interventional study, Madurai.*"

With reference to the above subject, I would like to bring to your kind notice that I, Dr. P. Premkumar, perceiving my Third Year Post Graduation In The Department Of Public Health Dentistry under the kind and able guidance of Dr. Umesh, M.D.S., have planned to conduct a research titled "Assessment of oral health status and effectiveness of an oral health education program in 5-15 years old hearing impaired special children- an *interventional study, Madurai.*" for which I kindly request your permission to conduct a trail research among students aged 5-15 years of your school. I therefore kindly request you to help me with the same at your prestigious Institution. I would be immensely obliged if you could permit me with this.

Thanking you,

For N/a Mrs. Kamaladevi.

Permitted to conduct the study & to share the results of the study with us.

Contact No: 7509941057

Kamaladevi

Yours Sincerely,

Dr. P. Premkumar

வாய்க்காதாரம் சார்ந்த உங்களுடைய அறிதல், எண்ணம் மற்றும் பராமரிக்கும் முறையைமதிப்பீடும்
கேள்வித்தாள்

வரிசை எண்:

பெயர்:

வயது:

பாலினம்:

தேதி:

வகுப்பு:

முகவரி:

தொலைபேசி எண்:

வாய்நலம் அறிதல் சார்ந்த கேள்விகள்

1. உங்களைப் பொருத்தவரையில் ஆரோக்கியமான பற்கள் என்றால் என்ன?

1. வெள்ளை மற்றும் பளபளப்பான பற்கள்
2. வலுவான மற்றும் பற்சொத்தை இல்லாத பற்கள்
3. தெரியாது

2. பற்சொத்தை உருவாவதற்கு சர்க்கரையும் ஒருகாரணம் என்று அறிவீர்களா?

1. ஆம்
2. இல்லை
3. தெரியாது

3. இரசாயன குளிர்பானங்கள் (Carbonated drinks) பற்களை பாதிக்குமா?

1. ஆம்
2. இல்லை
3. தெரியாது

4. சாப்பிட்டபின் ஒவ்வொரு முறையும் தண்ணீரினால் வாயை கொப்பளிப்பீர்களா?

1. ஆம்
2. இல்லை
3. தெரியாது

5. முறையாக பல்துலக்குவதாலும், (பிளாஸ்) பல்இடைநூல் பயன்படுத்துவதாலும் அதிகம் இனிப்பான பண்டங்களை உண்பதை தவிர்பதாலும் வாய் மற்றும் பல் சார்ந்த நோய்களை தவிர்க்கலாமா?

1. ஆம்
2. இல்லை
3. தெரியாது

6. ஃப்ளோரைடு, என்னும் வேதிப்பொருள் பற்பசை மற்றும் பல்பொடியில் இருந்தால் உங்கள் பற்களை வலுவாக்குமா?

1. ஆம்
2. இல்லை
3. தெரியாது

7. புகையிலை வாய் புற்றுநோய் மற்றும் சுகாதார கேடு விளைவிக்கும் என்பதை அறிவீர்களா?

1. ஆம்
2. இல்லை
3. தெரியாது

8. வாயின் சுகாதாரம் உடல்நலத்திற்கு அவசியமா?

1. ஆம்
2. இல்லை
3. தெரியாது

எண்ணம்

சார்ந்த கேள்விகள்

9. எவ்வளவு நாட்களுக்கு ஒருமுறை பல்மருத்துவரை அணுகுகிறீர்கள்?

1. 6 மாதங்களுக்கு ஒருமுறை
2. 12 மாதங்களுக்கு ஒருமுறை
3. எப்பொழுதாவது
4. பற்கள் சுகமில்லாதபொழுது
5. இதுவரை பார்த்ததில்லை

10. பல்மருத்துவரை பார்க்க காரணம் என்ன?

1. பற்சொத்தை
2. பல்வலி
3. ஈறில்ரத்தகசிவு
4. வாயில் ஏதேனும் பிரச்சனை உள்ளதா என்பதை பரிசோதனை செய்து கொள்வதற்காக

11. நீங்கள் சரியான இடைவெளி காலங்களில் பல்பரிசோதனை தேவை என்று நினைக்கிறீர்களா?

1. ஆம்
2. இல்லை
3. தெரியாது

12. பல்வலி சிகிச்சை மற்ற உறுப்புகளின் சிகிச்சை போன்று முக்கியத்துவம் வாய்ந்ததா?

1. ஆம்
2. இல்லை
3. தெரியாது

பராமரிக்கும் முறை சார்ந்த கேள்விகள்

13. பொதுவாக நீங்கள் எப்படி உங்கள் பற்களை சுத்தம் செய்கிறீர்கள்?

1. பல்துலக்கி
2. விரல்கள்
3. வேப்பகுச்சி

14. ஒருநாளைக்கு எத்தனை முறை நீங்கள் பற்களை சுத்தம் செய்கிறீர்கள்?

1. ஒருமுறை
2. இரண்டுமுறை
3. மூன்றுமுறை

15. நீங்கள் எவ்வாறு பற்களை சுத்தம் செய்கிறீர்கள்?

1. மேலும் கீழுமாக
2. வலதுஇடதுமாக
3. வட்டமாக
4. எல்லாம்சேர்ந்து

16. எவ்வளவு நாட்களுக்கு ஒருமுறை நீங்கள் பல்துலக்கியை மாற்றுகிறீர்கள்?

1. 1 – 3 மாதத்தில்
2. 3 – 6 மாதத்தில்
3. 1 வருடத்திற்கு
4. பல்துலக்கியேயும்வரை
5. மாற்றுவதில்லை

17. எந்த பொருளை கொண்டு நீங்கள் பற்களை சுத்தம் செய்கிறீர்களா?

1. பற்பசை
2. பற்பொடி
3. மற்றவை

18. நீங்கள் தினமும் உங்கள் நாக்கைசுத்தம் செய்கிறீர்களா?

1. ஆம்
2. இல்லை
3. தெரியாத



World Health Organization

Oral Health Assessment Form for Children, 2013

Leave blank (1)	Year (4)	Month (5)	Day (10)	Identification No. (11)	Orig/Dupl (14)	Examiner (15)	(16)	(17)	
General information:		Sex 1=M, 2=F (18)		Date of birth (19)		Age in years (24)		(25)	(26)
(Name)		Ethnic group (27)		Other group (28)		Years in school (31)		Occupation (32)	
Community (geographical location)		Urban (1)		Periurban (2)		Rural (3)		(36)	
Other data (37)		Other data (38)		Other data (39)		Other data (40)			
Other data (41)		Other data (42)		Extra-oral examination (43)		Extra-oral examination (44)			

<p>Dentition status</p> <table style="width: 100%; text-align: center;"> <tr> <td></td><td>17</td><td>16</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>61</td><td>62</td><td>63</td><td>64</td><td>65</td><td></td><td></td> </tr> <tr> <td>Crown (45)</td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td> </tr> <tr> <td>Crown (59)</td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td> </tr> <tr> <td></td><td>47</td><td>46</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td><td>71</td><td>72</td><td>73</td><td>74</td><td>75</td><td></td><td></td> </tr> <tr> <td></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td> </tr> </table>		17	16	55	54	53	52	51	61	62	63	64	65			Crown (45)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Crown (59)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		47	46	85	84	83	82	81	71	72	73	74	75				<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<p>Primary teeth</p> <p>Permanent teeth</p> <p>Status</p> <p>A 0 = Sound B 1 = Caries C 2 = Filled w/carries D 3 = Filled, no caries E 4 = Missing due to caries - 5 = Missing for any another reason F 6 = Fissure sealant G 7 = Fixed dental prosthesis/crown, abutment, veneer - 8 = Unerupted - 9 = Not recorded</p>
	17	16	55	54	53	52	51	61	62	63	64	65																																																																
Crown (45)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>																																																														
Crown (59)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>																																																														
	47	46	85	84	83	82	81	71	72	73	74	75																																																																
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>																																																														
<p>Periodontal status</p> <table style="width: 100%; text-align: center;"> <tr> <td></td><td>17</td><td>16</td><td>55</td><td>54</td><td>53</td><td>52</td><td>51</td><td>61</td><td>62</td><td>63</td><td>64</td><td>65</td><td></td><td></td> </tr> <tr> <td>(73)</td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td> </tr> <tr> <td>(87)</td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td> </tr> <tr> <td></td><td>47</td><td>46</td><td>85</td><td>84</td><td>83</td><td>82</td><td>81</td><td>71</td><td>72</td><td>73</td><td>74</td><td>75</td><td></td><td></td> </tr> <tr> <td></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td><td><input type="text"/></td> </tr> </table>		17	16	55	54	53	52	51	61	62	63	64	65			(73)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	(87)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		47	46	85	84	83	82	81	71	72	73	74	75				<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<p>Enamel fluorosis (101)</p> <p>Status</p> <p>0 = Normal 1 = Questionable 2 = Very mild 3 = Mild 4 = Moderate 5 = Severe 8 = Excluded (crown, restoration, "bracket") 9 = Not recorded (unerupted tooth)</p>
	17	16	55	54	53	52	51	61	62	63	64	65																																																																
(73)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>																																																														
(87)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>																																																														
	47	46	85	84	83	82	81	71	72	73	74	75																																																																
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>																																																														
<p>Gingival bleeding</p> <p>Scores</p> <p>0 = Absence of condition 1 = Presence of condition 9 = Tooth excluded X = Tooth not present</p>	<p>Dental erosion</p> <p>Severity</p> <p>(102) <input type="text"/></p> <p>0 = No sign of erosion 1 = Enamel lesion 2 = Dentinal lesion 3 = Pulp involvement</p> <p>No. of teeth</p> <p>(103) <input type="text"/> (104)</p>	<p>Dental trauma</p> <p>Status</p> <p>(105) <input type="text"/></p> <p>0 = No sign of injury 1 = Treated injury 2 = Enamel fracture only 3 = Enamel and dentine fracture 4 = Pulp involvement 5 = Missing tooth due to trauma 6 = Other damage 9 = Excluded tooth</p> <p>No. of teeth</p> <p>(106) <input type="text"/> (107)</p>	<p>Oral mucosal lesions</p> <table style="width: 100%;"> <tr> <td style="width: 50%;">Condition</td> <td style="width: 50%;">Location</td> </tr> <tr> <td>(108) <input type="text"/></td> <td>(111) <input type="text"/></td> </tr> <tr> <td>(109) <input type="text"/></td> <td>(112) <input type="text"/></td> </tr> <tr> <td>(110) <input type="text"/></td> <td>(113) <input type="text"/></td> </tr> </table> <p>0 = No abnormal condition 1 = Ulceration (aphthous, herpetic, traumatic) 2 = Acute necrotizing ulcerative gingivitis (ANUG) 3 = Candidiasis 4 = Abscess 8 = Other condition 9 = Not recorded</p> <p>0 = Vermilion border 1 = Commissures 2 = Lips 3 = Suli 4 = Buccal mucosa 5 = Floor of mouth 6 = Tongue 7 = Hard and/or soft palate 8 = Alveolar ridges/gingiva 9 = Not recorded</p>	Condition	Location	(108) <input type="text"/>	(111) <input type="text"/>	(109) <input type="text"/>	(112) <input type="text"/>	(110) <input type="text"/>	(113) <input type="text"/>	<p>Intervention urgency (114)</p> <p>0 = No treatment needed 1 = Preventive or routine treatment needed 2 = Prompt treatment (including scaling) needed 3 = Immediate (urgent) treatment needed due to pain or infection of dental and/or oral origin 4 = Referred for comprehensive evaluation or medical/dental treatment (systemic condition)</p>																																																																
Condition	Location																																																																											
(108) <input type="text"/>	(111) <input type="text"/>																																																																											
(109) <input type="text"/>	(112) <input type="text"/>																																																																											
(110) <input type="text"/>	(113) <input type="text"/>																																																																											

From

Dr. P. Premkumar,
II year Post graduate student,
Department of Public Health Dentistry,
Best Dental Science College,
Madurai.

Through

Dr. Bharathkumar Garla., MDS,
Head of the Department,
Department of Public Health Dentistry,
Best Dental Science College,
Madurai.

To

The Principal,
Best Dental Science College,
Madurai.

Respected Madam,

Sub: Request for Permission to conduct a research in partial fulfillment of the requirement of MDS curriculum.

With reference to the above subject, I would like to bring to your kind notice that I, Dr. P. Premkumar, Second Year Post Graduate In The Department Of Public Health Dentistry, have planned to conduct a research titled "**Assessment of oral health status and effectiveness of an oral health education program in 5- 15 years old hearing impaired special children- an interventional study, Madurai**". Therefore sir, I kindly request you to grant me permission to conduct this research.

Thanking you,

Date: 13.07.2017



PRINCIPAL
BEST DENTAL SCIENCE COLLEGE
MADURAI-625104

Yours Sincerely,

P. Prem Kumar
13/7/17

For H.O.D.
13/7/17
To The Principal.

READER
PUBLIC HEALTH DENTISTRY
BEST DENTAL SCIENCE COLLEGE
MADURAI

DEPT. OF PUBLIC HEALTH DENTISTRY
MADURAI 625 104.