

# DENTAL PLAQUE MATURITY STATUS AMONG HEARING-IMPAIRED CHILDREN IN KELANTAN

<sup>a</sup>Haliza Tugeman<sup>\*</sup>, <sup>b</sup>Normastura Abd Rahman, <sup>b</sup>Azizah Yusoff,  
<sup>c</sup>Mohd Khairi Md Daud

<sup>a</sup> Klinik Pergigian Jalan air Jernih, Kuala Terengganu

<sup>b</sup>Dental Public Health Unit, School of Dental Sciences, USM

<sup>c</sup>Department of Otorhinolaryngology, School of Medical Sciences, USM

# OUTLINE

- Introduction
- Objectives
- Materials and methods
- Results
- Discussion
- Conclusion and recommendation
- References

# INTRODUCTION

- Hearing impairments
  - Refers to both complete and partial loss of the ability to hear
  - Unseen handicapped
  - Communication difficulties
  - Could not express feelings, desire and needs effectively
  - Isolation

(Al-Abduljawad, 2003)

- Hearing impaired (HI) children
- Always need their parents or interpreters to help them to communicate with others

(Dalton et al., 2003)

# TYPES OF HEARING IMPAIRMENT

- Conductive hearing impairment
  - Problem in the outer or middle ear
  - Medically or surgically treatable eg; chronic middle ear infection
- Sensorineural hearing impairment
  - Problem with the inner ear or the hearing nerve
  - Mostly permanent and requires rehabilitation such as the use of a hearing aid

(WHO 2013)

# EPIDEMIIOLOGY

- Incidence
  - UK: 1.5/1000 (Watkin and Baldwin, 2011)
  - Singapore: 3.7/1000 (Daniel and Lim, 2012)
- Prevalence
  - Developing countries: 11.5%-20.3%  
(Stevens *et al.*, 2011)
  - Malaysia : 17.14%  
(Malaysia National and Hearing Disorder Survey, 2005)

# ORAL HEALTH PROBLEMS AMONG CHILDREN

Authors	Year	Children	Results
NOHSS	2007	Normal	12 year old: <ul style="list-style-type: none"><li>• Caries prevalence, 41.5%</li><li>• Need improvement in personal oral hygiene and scaling, 55.7%</li></ul>
Kumar <i>et al.</i> ,	2008	HI	Fair to poor oral hygiene, 76%
Jain <i>et al.</i> ,	2008	HI	Caries prevalence, 83.9% Mean DMFT, 2.6
Wei <i>et al.</i> ,	2012	HI and Normal children	Caries prevalence : <ul style="list-style-type: none"><li>• HI: 55.9%</li><li>• Normal:13.8%</li></ul>

# DENTAL PLAQUE AND ORAL HEALTH

- Dental plaque is the diverse microbial community on tooth surface embedded in a matrix of polymers of bacterial and salivary origin

(Marsh *et al.*, 2009)

- Immature dental plaque
  - present continuously on tooth

(Seneviratne *et al.*, 2011)

- Mature dental plaque
  - 72 hours in vivo
  - Dominated by pathogens linked to dental caries and periodontal disease

(Seneviratne *et al.*, 2011)

- Dental plaque control
  - First choice for elimination of etiological factor for caries and periodontal disease

(Seneviratne *et al.*, 2011; Walsh, 2009)



# OBJECTIVE

- General
  - To compare the dental plaque maturity status between hearing-impaired (HI) and normal children

## SPECIFIC

1. To determine and compare dental plaque maturity score between HI children and normal children
2. To determine and compare dental plaque maturity level between HI children and normal children

# MATERIALS AND METHODS

11

# STUDY DESIGN

- Comparative cross sectional study
- Comparing 2 groups: HI children and normal children
- Duration of study: Jun-Ogos 2014
- Venue: Sekolah Pendidikan Khas Kelantan, Sekolah Kebangsaan Kandis, Sekolah Menengah Kandis

# POPULATION AND SAMPLE

	<b>HI</b>	<b>Normal</b>
Reference population	HI children in Kelantan	Normal children in Kelantan
Source population	HI children in special school	Normal children in Bachok district
Sampling frame		
i. Inclusion criteria	HI children age 7-14 years old	Normal children age 7-14 years old
ii. Exclusion criteria	<ul style="list-style-type: none"> <li>• Impaired manual dexterity</li> <li>• Mental disability</li> <li>• Unable to read or understand sign language</li> </ul>	<ul style="list-style-type: none"> <li>• Impaired manual dexterity</li> <li>• Mental disability</li> </ul>

# SAMPLE SIZE

Variable	Mean (SD)	Detectable diff	n	n+20%
Plaque score	1.33 (0.70) (Hebbal <i>et al.</i> , 2011)	1	64	77/group

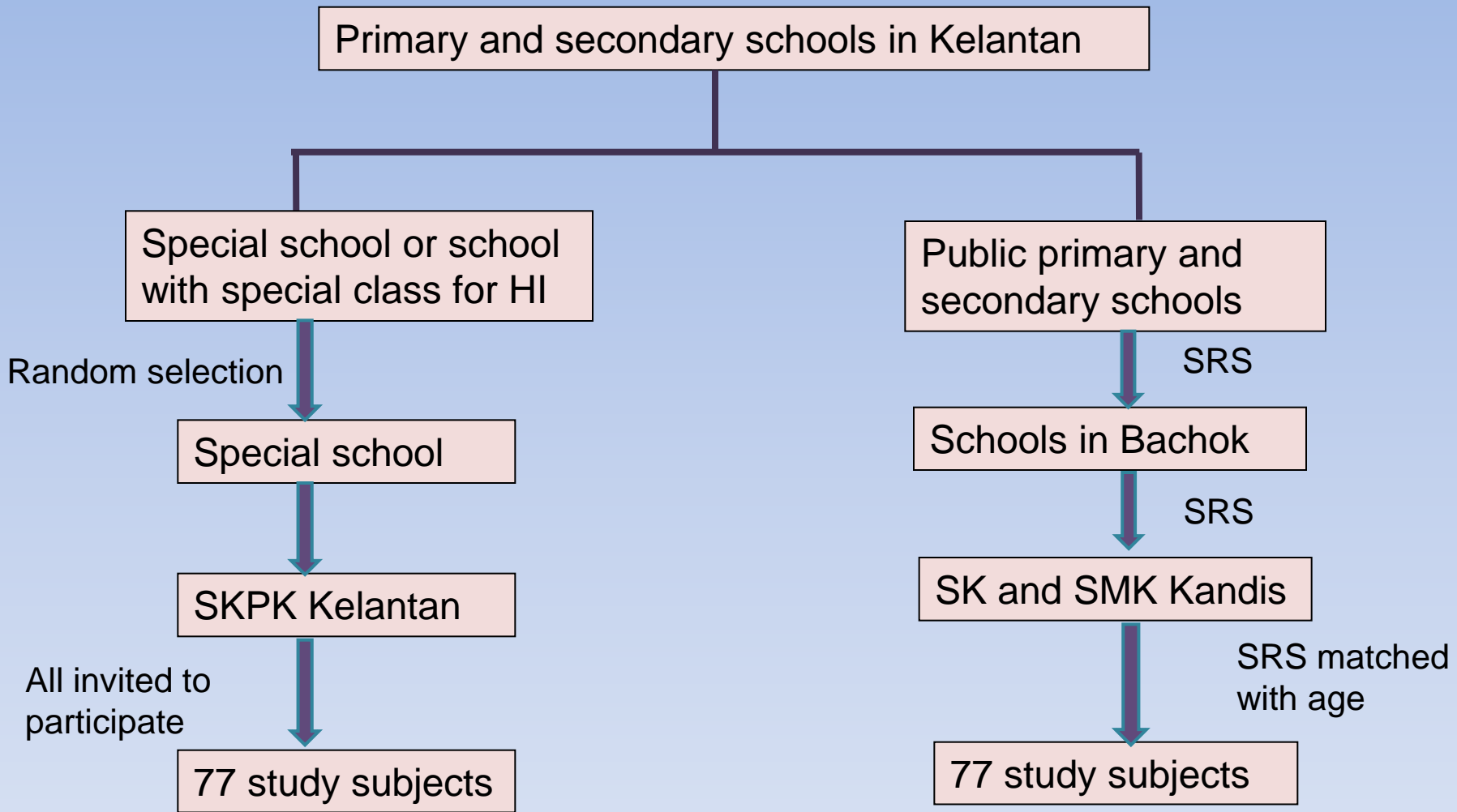


Figure 1: Flow chart of sampling method

SRS=simple random sampling

# RESEARCH TOOLS

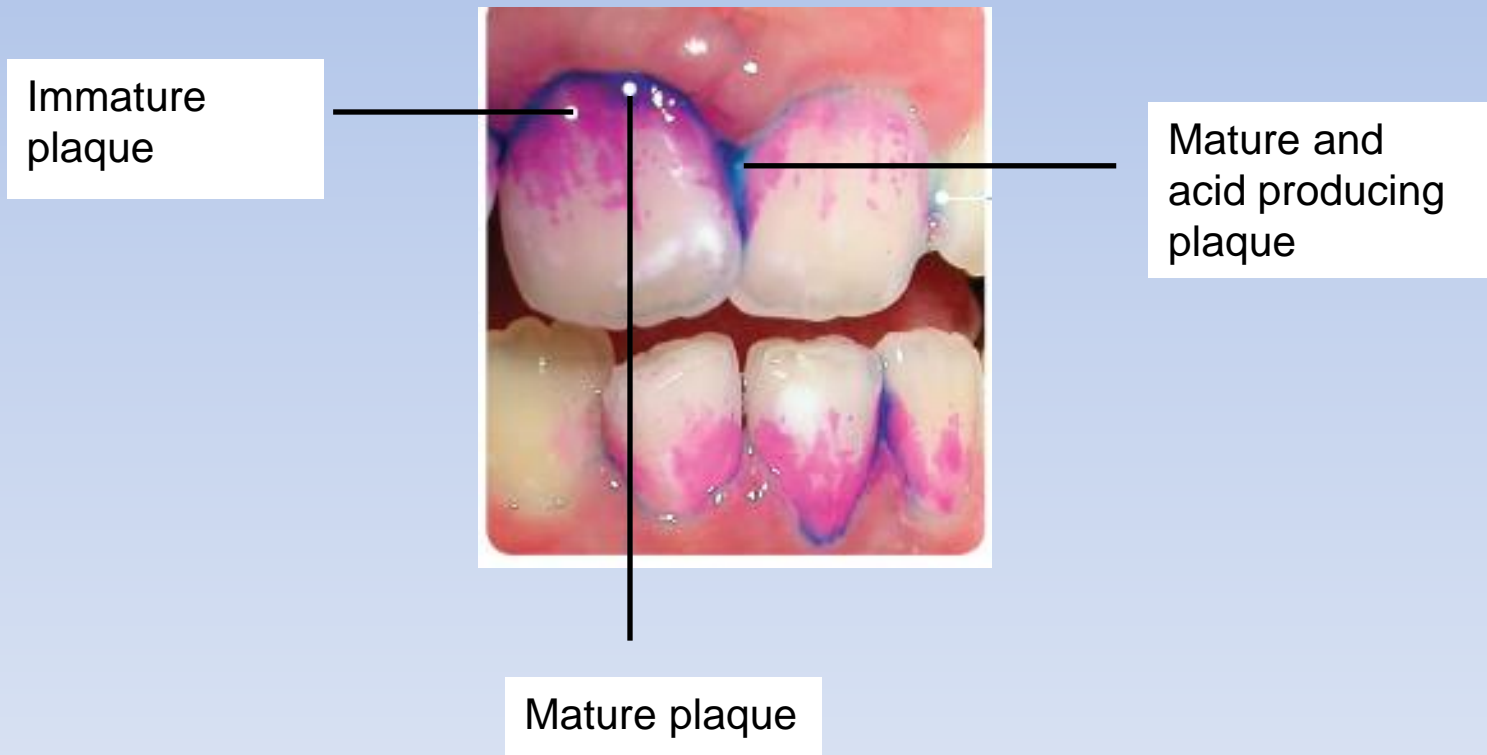
- Record sheets
- GC Tri Plaque ID Gel <sup>TM</sup> (TPID) dental plaque disclosing gel by GC Corporation, Japan



# Data collection procedure

- Calibration exercise over a benchmark on dental plaque assessment
  - Kappa score: 0.95
- Dental plaque maturity
  - Single examiner

# Dental plaque maturity assessment



**Figure 2 Colour changes on TPID**

## TPID colour indication

Colour	Indication	Score
No colour	No plaque	0
Pink or red	Immature plaque	1
Blue or purple	Mature plaque at least 48 hours	2
Light blue	Mature and acid producing plaque	3

Dental plaque maturity score (DPMS) =

$$\frac{\text{No plaque (0)} + \text{immature plaque (1)} + \text{mature plaque (2)} + \text{acid producing plaque (3)}}{\text{Number of surfaces evaluated}}$$

**Total DPMS: 0-3**

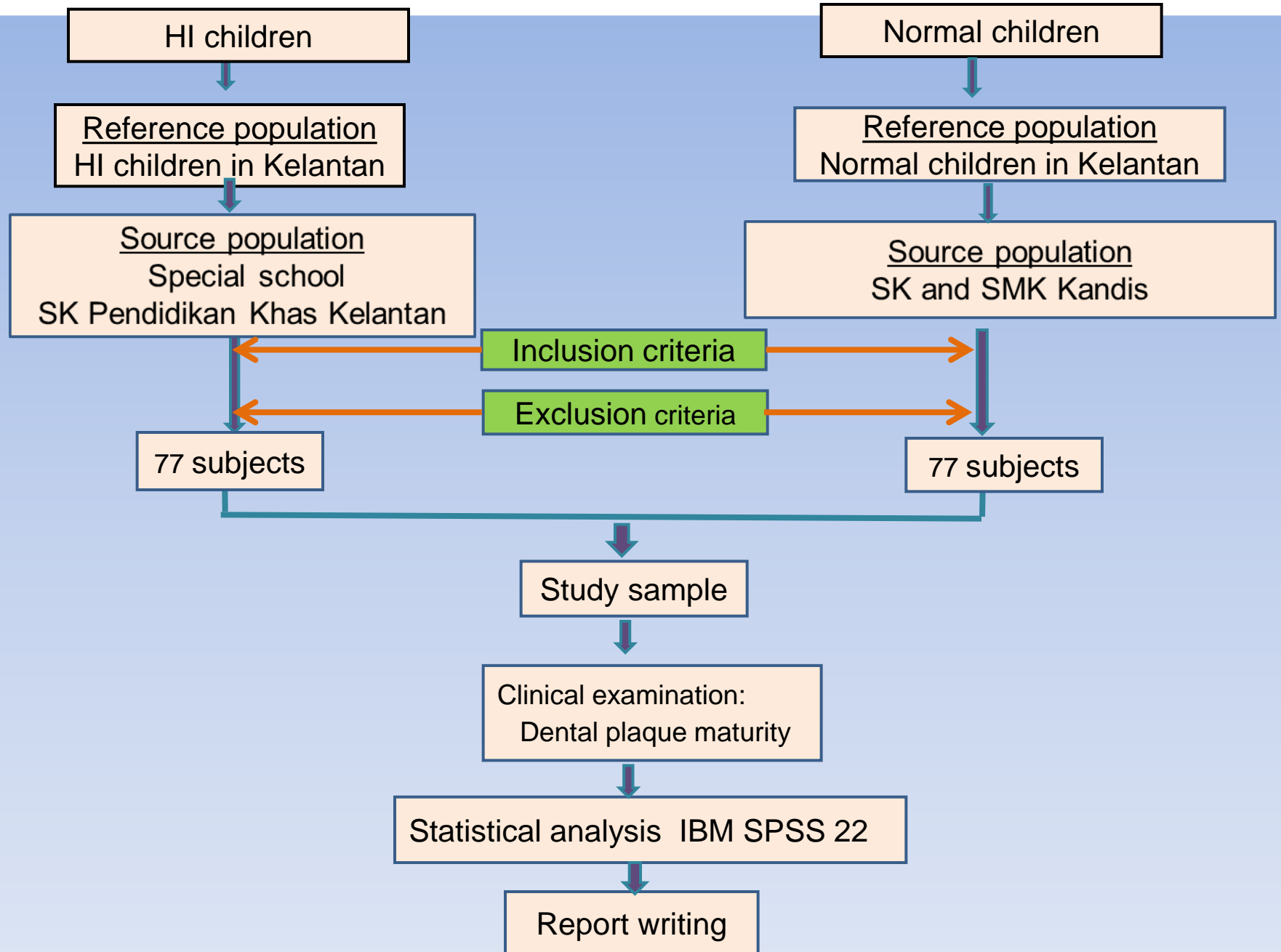


Figure 3: Flow chart of the study

# STATISTICAL ANALYSIS

- IBM SPSS version 22
- Continuous variable: mean (SD), median (IQR)
- Categorical variable : percentage (%)
- Dental plaque score between HI and normal children
  - Independent t-test
- Dental plaque maturity level between HI and normal children
  - Chi-squared test
- The level of significant was set at 0.05

# ETHICAL CONSIDERATION

- Ethical approval : obtained from Research and Ethics committee, USM (Human)
  - Reference no: FWA Reg. No: 00007718; IRB Reg. No: 00004494
- Permission from Kementerian Pendidikan Malaysia
  - KP(BPPDP)603/5/JLD. 10
- Permission from Jabatan Pendidikan Kelantan to conduct the study at schools
  - JPKn/SPS/UPP.600-5/4 Jld.2(96)

# RESULTS

Table 1: Sociodemographic profiles of children

	HI Children(n=64) n(%)	Normal children(n=69) n(%)
Age mean(SD)	12.0(2.12)	11.7(2.23)
Sex		
Male	30(46.9)	20(29.0)
Female	34(53.1)	47(71.0)
Race		
Malay	64(100.0)	69(100.0)
Level of hearing impairment		
Mild	2(3.4)	NA
Moderate	4(6.8)	
Severe	17(28.8)	
Profound	36(61.0)	
Use of hearing aid		
Yes	37(57.8)	
No	27(42.2)	



Table 2: Dental plaque maturity score between HI children and normal children

Children	n	Plaque scores	Mean difference (95% CI)	t-stat (df)	p-value
HI	61	1.8(0.57)	-0.56 (-0.71,-0.41)	-7.29(1)	<0.001
Normal	68	1.3(0.20)			

Table 3: Plaque score group between HI children and normal children

Plaque maturity level	HI children n(%)	Normal children n(%)	$\chi^2$ -stat (df)	p-value
Immature plaque	21 (34.4)	59 (86.8)	37.39 (1)	<0.001
Mature plaque	40 (65.6)	9 (13.2)		

# DISCUSSION

- Dental plaque maturity scores and level between HI and normal children
  - HI have more mature plaque
- Oral hygiene of disable children including HI
  - was poor compared to normal children
  - reasons were due to lack of understanding, physical disability, lack of coordination, muscle disabilities and lack of dental treatment for this disable children

(Ameer *et al.*, 2012; Jain *et al.*, 2013)

## Discussion

- Caries was high among the HI compared to the normal individual, 55.9% and 13.8% respectively
  - suggest there was high mature plaque among the HI compared to normal individual

(Wei *et al.*, 2012)

- Children with special health care needs (SHCN) had significantly higher Community Periodontal Index (CPI) score compared to normal children
  - could be attributed by improper tooth brushing, frequency of tooth brushing

(Purohit *et al.*, 2010)

- HI children generally lack of proper oral health practice compared to normal children
  - normal children might have more advantages in term of comprehending oral health message delivered at school compared to HI children

(Wei *et al.*, 2012; Doichinova and Peneva, 2011)

- Brushing twice per day was significantly lower among HI children (30.6%) compared with normal children (49.3%)
  - Might due to limited oral health knowledge which lower the oral health practices

(Oredugba, 2004)

## Discussion

- Only 46.4% of HI children brush teeth before going to bed at night compared with normal children, 82.6%
  - Higher risk of oral disease such as caries and periodontal disease

(Jain *et al.*, 2008; Kumar *et al.*, 2008)

- Low knowledge and lack of oral hygiene practice among HI children were due to communication difficulties

(Champion and Holt, 2000)
- Lack of communication
  - Lead to inequalities in access to health care among HI compared to normal individual

(Ubido *et al.* 2002)

- TPID

- Educational purpose to engage patient for proper oral hygiene practice and to assess the patient compliance
- Quick result in colour changes and it is easy to use for children
- Demarcate the presence of acidogenic bacteria based on the presence of light blue plaque
- Asses not only the plaque presence, but also the severity of plaque maturity on each child
- Chair side dental education in high risk strategy to prevent caries and periodontal disease

(Maragliano-Muniz *et al.*, 2012; Walsh, 2009)

# CONCLUSION

- HI children significantly had higher plaque maturity scores compared to normal children ( $p < 0.001$ )
- Oral health messages could not be delivered to this children using common method delivered to normal children that might be associated with communication difficulties



# RECOMMENDATION

- The delivery of oral health education(OHE) and use of educational materials by oral health professionals need to be strengthened at the special school for HI children
- Oral health education which suitable for HI children
  - Example using video with sign language
  - Emphasis should be given on the importance of tooth brushing and use of fluoridated tooth paste to nurture good habit among HI children

- Dentist or dental nurse may
  - learn some basic sign language to remove communication barrier while treating HI children
- TPID
  - Can be made as a useful tool in oral health counselling as it can detect the dental plaque maturity
- Teachers involvement as trainers in OHE at school might make better changes in improving oral health of HI children
  - Provided with education, instructional tools to enable them to give specific training to target audience
  - Knowledge distribution: long term sustainability in the community

# ACKNOWLEDGEMENTS

- Ministry of Education, Malaysia
- Headmaster and teachers who helped during this study (Sekolah Pendidikan Khas Kelantan, Sekolah Kebangsaan Kandis, Sekolah Menengah Kebangsaan Kandis)
- Participants in this study ; whom I have learned so much and share knowledge with others

# REFERENCES

- Watkin, P. & Baldwin, M. (2011). Identifying deafness in early childhood: requirements after the newborn hearing screen. *Archives of disease in childhood*, 96(1), 62-66.
- Hong Wei, Yan-Ling Wang, Xiao-Na Cong, Wan-Qin Tang, Ping-Min Wei. Survey and analysis of dental caries in students at a deaf-mute high school. *Research in developmental disabilities* 2012. 33(1279-1286)
- Orfaly R.A., Frances, J.C., Campbell P, Whittermore, B., Joly, B., Koh, H. (2005). Train the trainers as an educational model in public health preparedness. *J Public Health Management Practice*, November (Suppl) 123-127
- WHO 2012 <http://www.who.int/mediacentre/factsheets/fs300/en/> last accessed 17.2.2013

# REFERENCES

- Al-Abduljawad, K. A. (2003). Survey of deaf children using individual hearing aid. Bahrain Medical Bulletin, 25 (2), 74-6
- Champion, J. & Holt, R. (2000). Paediatric dentistry: Dental care for children and young people who have a hearing impairment. British dental journal, 189 (3), 155-159
- Doichinova, L. & Peneva, M. (2011). Questionnaire survey on oral hygiene awareness of children with hearing impairment. problems of dental medicine, 21
- Ubido J, Huntington J, Warburton D. Inequalities in access to healthcare by women who are deaf. Health Social Care Community 2002;10:247-53

THANK YOU