

Revisiting Guttman Scale in Bhopal City (in 2021)

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Abstract

Background: Oral diseases are the most prominent diseases, affecting over half of the global population and their quality of life. Oral health is a crucial component of overall health, yet it is frequently overlooked. Urbanization, gender, and the frequency and manner of brushing all have an impact on oral health.

Aim: The aim of the present study was to analyze oral health attitude and knowledge among parents/ caregivers in Bhopal city (both urban and semi-urban areas) and corroborate with the Guttman analysis in 1989.

Materials & Methods: The present study was conducted among the school going children of both urban/semi-urban schools from Bhopal. Two schools from each zone were randomly selected and a sample of 297 children of age 6-11 years which were further subjectively divided into two groups, Group A (urban-

153) and Group B (semi-urban – 144). The informed consent was taken from school and parents/caregivers. The self-administered questionnaire was written in English and later translated into local languages (Hindi, and Urdu) which was answered by the parents/ caregivers

Results: Group B had better knowledge about the oral hygiene measures and the understanding about the consumption of sugar and its impact on the dental health and positive attitude towards the prevention of oral diseases and the maintenance of oral hygiene in comparison of Group A. our both newly developed scales of attitude and knowledge fulfilled the criteria for an acceptable Guttman Scale.

Keywords: Attitude, Knowledge, Oral Health, Guttman Scale, School children.

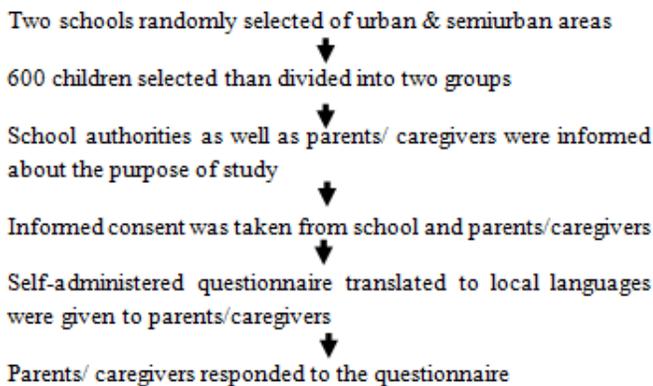
Introduction

Oral health disorders are the most frequent non-communicable diseases, impacting almost half of the world's population. ¹ Dental caries affects around 2.4 billion individuals, with 486 million children suffering from deciduous teeth caries. Untreated dental caries in deciduous teeth was the tenth most frequent disease in the world in 2010, affecting 621 million children and accounted for 9% of the global population. ¹ Dental caries has a catastrophic influence on children's nutritional, health, and social well-being, according to the World Health Organization (WHO) (2013). ²

Material and methods-

Study design: A cross-sectional study was conducted in the among the school going children of both urban/semi-urban schools from Bhopal. Two schools from each zone were randomly selected and a sample of 600 children of age 6-11 years which were further subjectively divided into two groups, Group A (urban- 306, 150 Girls and 156 Boys) and Group B (semi-urban – 294, 140 Girls and 147 Boys). The 20 self-administered questionnaire were written in English and later translated into local languages (Hindi, and Urdu) which was answered by the parents/ caregivers.

Methodology



Results

Comparison of attitude towards the reason of the visits to the dentist between the parents of boys and girls was

shown in **Table 1a** and the comparison of rest of the attitude questions between parents/caregivers of group A has been mentioned in **Table 1b** and Graphical illustration of comparison has shown in **Graph 1**. Comparison of the knowledge between group A has been mentioned in **Table 2** whereas the graphical illustration of this has been mentioned in **Graph 2**. Very minimal differences were noticed in the attitude and knowledge of parents of boys and girls in Group A. Similarly, **Table 3 a and b** depicts the comparison of attitude between the parents of Group B and **Graph 3** depicts the illustrations of this. Comparison of knowledge between Group B has shown in **Table 4** and **Graph 4** respectively. Minimal significant differences had been noticed in the comparison of attitude and Knowledge of Group B similar to that of Group A.

Comparison of attitude towards the prevention of oral diseases between Group A and Group B had shown in **Table 5 a & b** and in **Graph 5 a & b** respectively. Whereas, the comparison of knowledge between the groups had been shown in **Table 6** and in **pie diagrams (graph 6- Q1 to Q10)** of each of knowledge questions. People in Group A had fair knowledge but poor attitude towards dental health whereas Group B had better knowledge and positive attitude towards dental health.

Petersen mentioned the evaluation criteria for an acceptable **Guttman Scale** and our both scales on attitude and knowledge fulfills that criteria which is mentioned in **Table 7**. Therefore, both the scales were validated **Guttman Scale**.

Table 1a: Comparison of ATTITUDE between the parents of Male and Female in Group A

Reasons	Female		Male		χ^2 and P value
	Yes	No	Yes	No	
Pain in teeth	80	73	79	74	$\chi^2 = 0.03,$ P value =1.00
Bad breath	67	86	66	87	$\chi^2 = 0.05,$ P value =0.99
Bleeding from gums	69	84	77	76	$\chi^2 = 1.09,$ P value =0.65
Food lodgment	78	75	78	75	$\chi^2 = 0.00$ P value =1.00

Table 1b: Comparison of ATTITUDE between the parents of Male and Female in Group A

Items	Girls		Boys		χ^2 and P value
	Yes	No	Yes	No	
Do you think tooth decay is transmissible?	72	81	74	79	$\chi^2 = 0.05,$ P value =0.909
Does night time bottle/ breast feeding causes decay of teeth?	70	83	70	83	$\chi^2 = 0.00,$ P value =1.00
Do you think frequent and prolonged bottle-feeding causes decay of teeth/ dental caries?	67	86	74	79	$\chi^2 = 0.64,$ P value =0.49
Do you think prolonged use of pacifier can be harmful?	61	92	64	89	$\chi^2 = 0.12,$ P value =0.89
Do you think children's teeth needs to be cleaned?	71	82	71	82	$\chi^2 = 0.00,$ P value =1.00
Do you think children can brush their teeth on their own	64	89	68	85	$\chi^2 = 0.21,$ P value =0.73
Does swallowing of tooth paste is harmful ?	73	80	69	84	$\chi^2 = 0.21,$ P value =0.73
Do you need to visit dentist by two years of age ?	69	84	61	92	$\chi^2 = 0.85,$ P value =0.42
Do you think balanced diet is necessary for healthy teeth?	74	79	81	72	$\chi^2 = 0.64,$ P value =0.49

Graph 1: Comparison of ATTITUDE between the parents of Male and Female in Group A

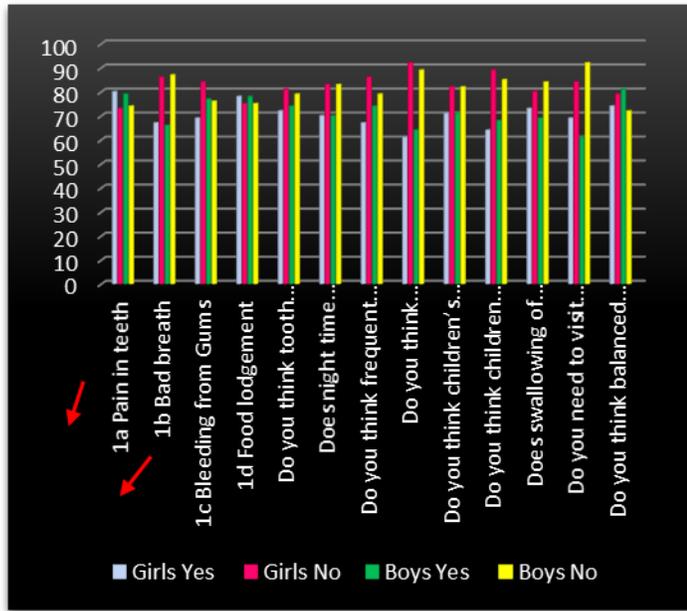


Table 2: Comparison of KNOWLEDGE regarding oral health of parents in Group A

Items	Girls		Boys		χ^2 and P value
	Yes	No	Yes	No	
Are you aware that first milk teeth develop by the age of six months?	78	75	78	75	$\chi^2 = 0.00,$ P value =1.00
Did you know that Children have 20 milk teeth by the age 3 years?	73	80	76	77	$\chi^2 = 0.12,$ P value =0.82
Cleaning of baby's mouth is very important. Do you agree?	78	75	83	70	$\chi^2 = 0.32,$ P value =0.65
Do you think it's necessary to monitor your child while brushing of their teeth?	77	76	79	74	$\chi^2 = 0.05,$ P value =0.91
Do you believe that children's teeth should be cleaned as soon as their first teeth appear?	79	74	80	73	$\chi^2 = 0.01,$ P value =1.00
Can dental decay affect infants less than 2 year old?	80	73	74	79	$\chi^2 = 0.47,$ P value =0.57
Can excess consumption of sweetened food/ drinks cause dental decay?	81	72	81	72	$\chi^2 = 0.00,$ P value =1.00
Do you think fillings (cosmetic dental restorations) of	70	83	72	81	$\chi^2 = 0.05,$

baby teeth are necessary ?					P value =0.91
Are you aware of the fact that fluoride prevents dental decay	69	84	82	71	$\chi^2 = 2.21,$ P value =0.14
Will twice a day tooth brushing helps in preventing dental decay?	71	82	78	75	$\chi^2 = 0.64,$ P value =0.49

Graph 2: Comparison of KNOWLEDGE regarding oral health of parents in Group A

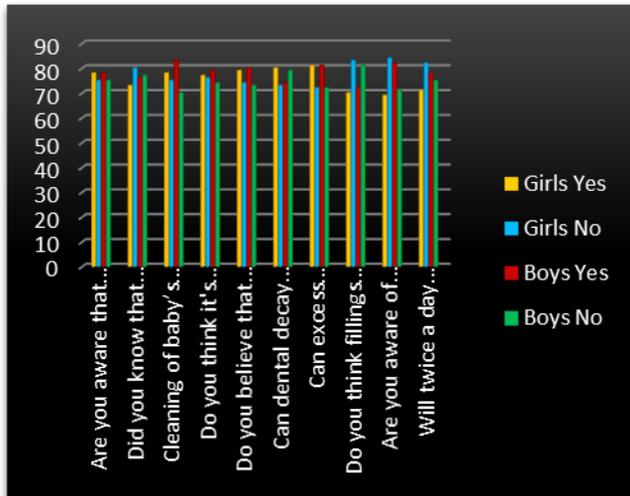


Table 3 a: Comparison of ATTITUDE between the parents of Male and Female in Group B

Reasons for visit to dentist	Female		Male		χ^2 and P value
	Yes	No	Yes	No	
Pain in teeth	95	55	88	56	$\chi^2 = 0.95, P \text{ value} =0.76$
Bad breath	86	64	79	65	$\chi^2 = 0.30, P \text{ value} =0.88$
Bleeding from gums	85	65	77	67	$\chi^2 = 0.84, P \text{ value} =0.81$
Food lodgment	87	63	79	65	$\chi^2 = 1.01, P \text{ value} =0.68$

Table 3 b: Comparison of ATTITUDE between the parents of Male and Female in Group B

Items	Girls		Boys		χ^2 and P value
	Yes	No	Yes	No	
Do you think tooth decay is transmissible ?	85	65	80	64	$\chi^2 = 0.037,$ P value =0.907
Does night time bottle/ breast feeding causes decay of teeth?	86	64	81	63	$\chi^2 = 0.035,$ P value =0.906
Do you think frequent and prolonged bottle-feeding causes decay of	86	64	81	63	$\chi^2 = 0.035,$

teeth/ dental caries?					P value =0.906
Do you think prolonged use of pacifier can be harmful?	82	68	77	67	$\chi^2 = 0.12,$ P value =0.89
Do you think children’s teeth needs to be cleaned?	81	69	76	68	$\chi^2 = 0.00,$ P value =1.00
Do you think children can brush their teeth on their own	80	70	75	69	$\chi^2 = 0.21,$ P value =0.73
Does swallowing of tooth paste is harmful ?	78	72	73	71	$\chi^2 = 0.21,$ P value =0.73
Do you need to visit dentist by two years of age ?	72	78	69	75	$\chi^2 = 0.85,$ P value =0.42
Do you think balanced diet is necessary for healthy teeth?	85	65	79	65	$\chi^2 = 0.64,$ P value =0.49

Graph 3: Comparison of ATTITUDE between the parents of Male and Female in Group B

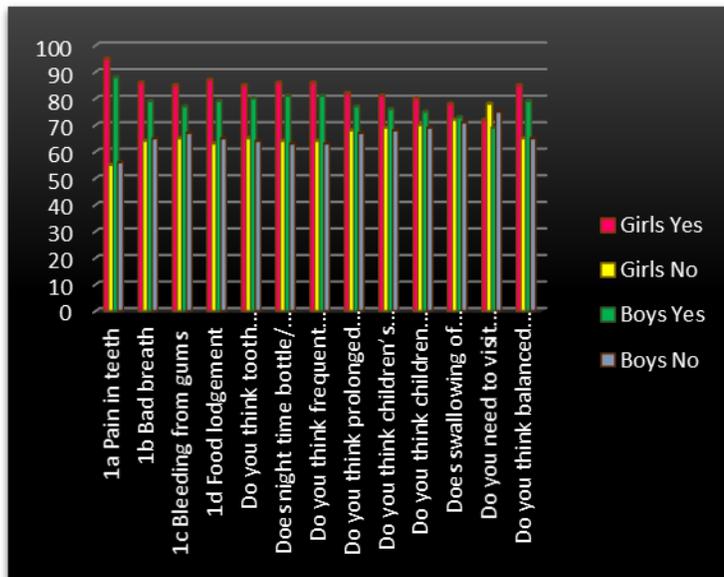


Table 4: Comparison of KNOWLEDGE regarding oral health of parents in Group B

Items	Girls		Boys		χ^2 and P value
	Yes	No	Yes	No	
Are you aware that first milk teeth develop by the age of six months?	91	59	86	58	$\chi^2 = 0.03,$ P value =0.91
Did you know that Children have 20 milk teeth by the age 3 years?	87	63	83	61	$\chi^2 = 0.004,$ P value =1.00

Cleaning of baby’s mouth is very important. Do you agree?	89	61	84	60	$\chi^2 = 0.03,$ P value =0.91
Do you think it's necessary to monitor your child while brushing of their teeth?	93	57	88	56	$\chi^2 = 0.006,$ P value =1.00
Do you believe that children's teeth should be cleaned as soon as their first teeth appear?	85	65	80	64	$\chi^2 = 0.04,$ P value =0.90
Can dental decay affect infants less than 2 year old?	83	67	78	66	$\chi^2 = 0.04,$ P value =0.90
Can excess consumption of sweetened food/ drinks cause dental decay?	89	61	84	60	$\chi^2 = 0.003,$ P value =1.00
Do you think fillings (cosmetic dental restorations) of baby teeth are necessary ?	87	63	79	65	$\chi^2 = 0.29,$ P value =0.64
Are you aware of the fact that fluoride prevents dental decay	85	65	76	68	$\chi^2 = 0.31,$ P value =0.66
Will twice a day tooth brushing helps in preventing dental decay?	84	66	79	65	$\chi^2 = 0.03,$ P value =0.91

Graph 4: Comparison of KNOWLEDGE regarding oral health of parents in Group B

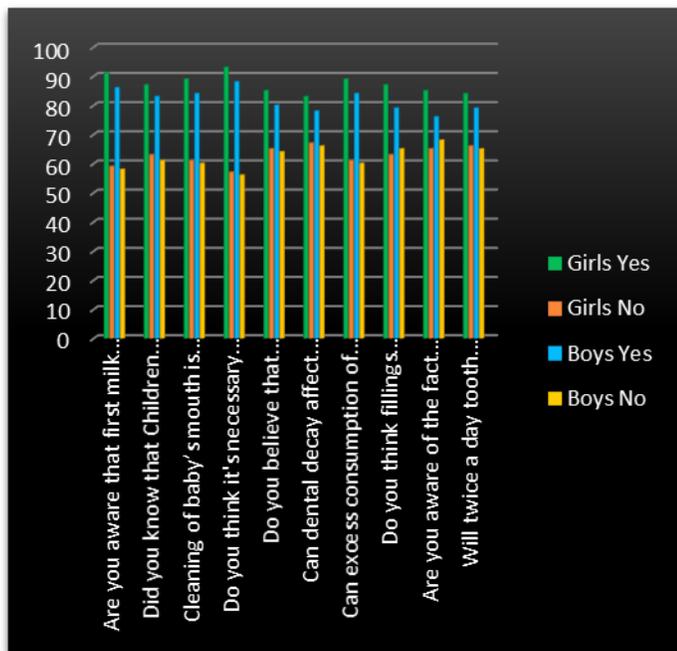


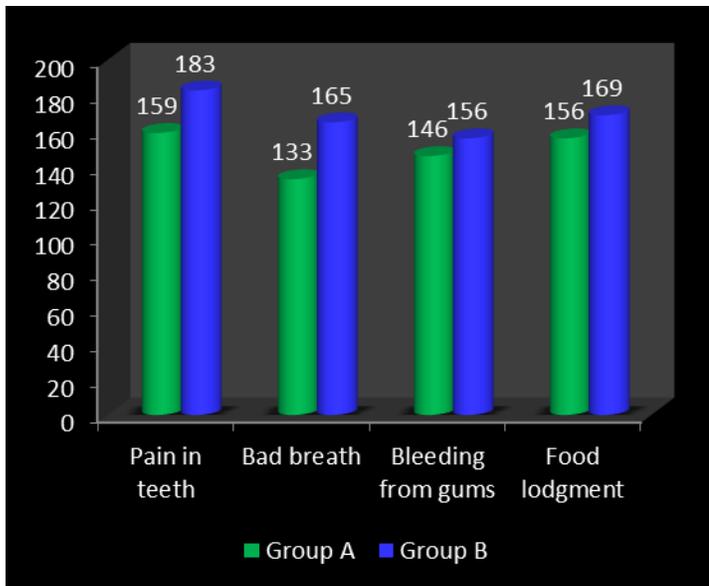
Table 5 a: Comparison of Reason of Visiting Dentist between Group A & B

Reasons	Group A		Group B		χ^2 and P value
	Yes	No	Yes	No	
Pain in teeth	159 (52.0%)	147 (48.0%)	183 (62.2%)	111 (37.8%)	$\chi^2 = 4.19,$ P value =0.036*
Bad breath	133 (43.5%)	173 (56.5%)	165 (56.1%)	129 (43.9%)	$\chi^2 = 4.32,$ P value =0.0026*
Bleeding from gums	146 (47.7%)	160 (52.3%)	156 (53.1%)	138 (46.9%)	$\chi^2 = 2.90,$ P value =0.14
Food lodgment	156 (51.0%)	150 (49.9%)	169 (57.5%)	125 (42.5%)	$\chi^2 = 1.15$ P value =0.29

Table 5 b: Comparison of ATTITUDE of parents between Group A & Group B

Items	Group A		Group B		χ^2 and P value
	Yes	No	Yes	No	
Do you think tooth decay is transmissible?	146	160	165	14 4	$\chi^2 = 4.24,$ P value =0.041*
Does night time bottle/ breast feeding causes decay of teeth?	140	166	167	14 2	$\chi^2 = 7.32,$ P value =0.007*
Do you think frequent and prolonged bottle-feeding causes decay of teeth/ dental caries?	141	165	167	14 2	$\chi^2 = 6.90,$ P value =0.009*
Do you think prolonged use of pacifier can be harmful?	125	181	159	13 5	$\chi^2 = 10.53,$ P value =0.001*
Do you think children's teeth needs to be cleaned?	142	164	157	13 7	$\chi^2 = 2.93,$ P value =0.102
Do you think children can brush their teeth on their own	132	174	155	13 9	$\chi^2 = 5.51,$ P value =0.022*
Does swallowing of tooth paste is harmful ?	142	164	151	14 3	$\chi^2 = 1.21,$ P value =0.256
Do you need to visit dentist by two years of age ?	130	176	141	15 3	$\chi^2 = 1.81,$ P value =0.19
Do you think balanced diet is necessary for healthy teeth?	155	151	164	14 5	$\chi^2 = 1.58,$ P value =0.228

Graph 5 a: Comparison of Reason Of Visiting Dentist between Group A & B



Graph 5 b: Comparison of ATTITUDE of parents between Group A & Group B

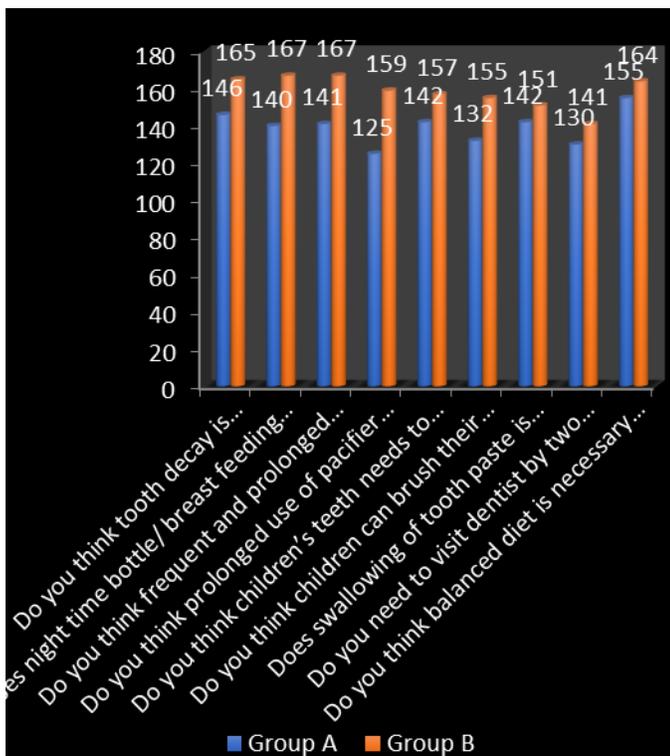


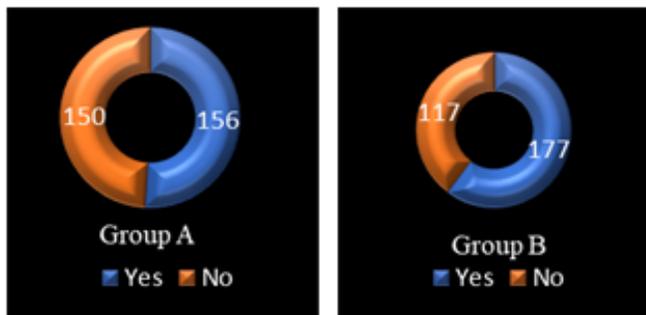
Table 6: Comparison of KNOWLEDGE of parents between Group A & Group B

Items	Group A		Group B		χ ² and P value
	Yes	No	Yes	No	
Are you aware that first milk teeth develop by the age of six months?	156	150	177	117	χ ² = 5.16, P value =0.026*

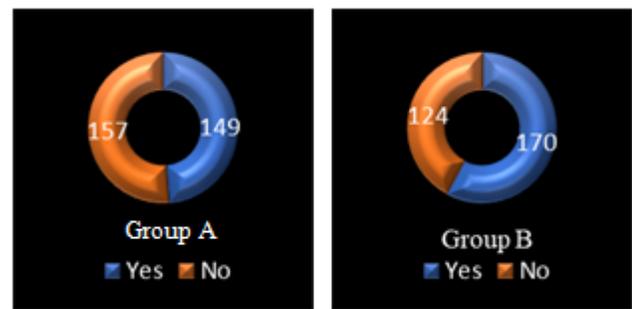
Did you know that Children have 20 milk teeth by the age 3 years?	149	157	170	124	$\chi^2 = 5.02,$ P value =0.027*
Cleaning of baby’s mouth is very important. Do you agree?	161	145	173	121	$\chi^2 = 0.32,$ P value =0.65
Do you think it's necessary to monitor your child while brushing of their teeth?	156	150	181	113	$\chi^2 = 5.84,$ P value =0.019*
Do you believe that children's teeth should be cleaned as soon as their first teeth appear?	159	147	165	129	$\chi^2 = 1.04,$ P value =0.326
Can dental decay affect infants less than 2 year old?	154	152	161	133	$\chi^2 = 1.18,$ P value =0.289
Can excess consumption of sweetened food/ drinks cause dental decay?	162	144	173	121	$\chi^2 = 2.11,$ P value =0.162
Do you think fillings (cosmetic dental restorations) of baby teeth are necessary ?	142	164	166	128	$\chi^2 = 6.07,$ P value =0.014*
Are you aware of the fact that fluoride prevents dental decay	151	155	161	133	$\chi^2 = 1.76,$ P value =0.19
Will twice a day tooth brushing helps in preventing dental decay?	149	157	163	131	$\chi^2 = 2.73,$ P value =0.103

Graph 6 (Q1 to Q10)-

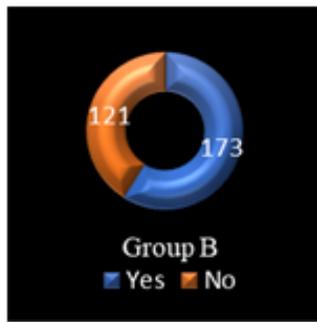
Q1. Are you aware that first milk teeth develop by the age of six months?



Q2. Did you know that Children have 20 milk teeth by the age of 3 years?



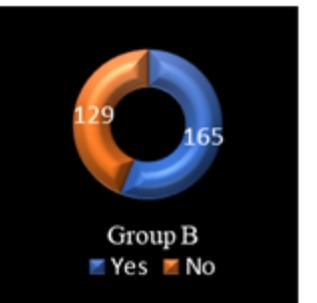
Q3. Cleaning of baby’s mouth is very important. Do you agree?



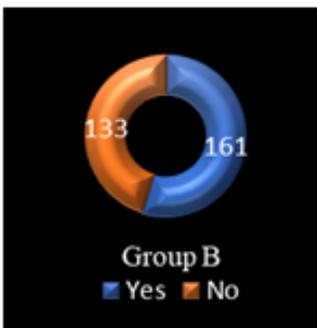
Q4. Do you think it's necessary to monitor your child while brushing of their teeth?



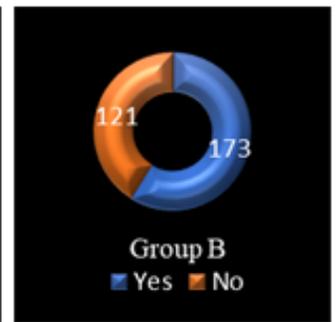
Q5. Do you believe that children's teeth should be cleaned as soon as their first teeth appear?



Q6. Can dental decay affect infants less than 2 year old?



Q7. Can excess consumption of sweetened food/ drinks cause dental decay?



Q8. Do you think fillings (cosmetic dental restorations) of baby teeth are necessary ?



Q9. Are you aware of the fact that fluoride prevents dental decay?



Q10. Will twice a day tooth brushing helps in preventing dental decay?

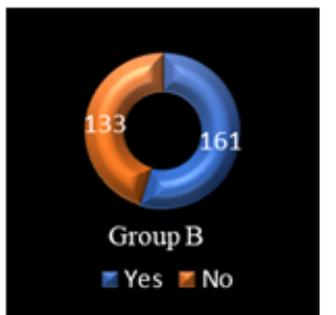


Table 7: Evaluation criteria adopted from original GUTTMAN Scales On Attitude & Knowledge (1989) ³

Evaluation criteria	Attitude	Knowledge
Coefficient of Reproducibility (CR)	0.94	0.95
Minimal Marginal Reproducibility (MMR)	0.72	0.79
Percent improvement	0.22	0.16
Coefficient of Scalability (CS)	0.78	0.76

Discussion

Children try to imitate their parents/caregivers whose prime role lies in developing healthy habits in their children, so they should have a fair knowledge about oral hygiene. Sometimes despite of having positive attitude towards prevention of dental caries conflicts regarding use of fluoride, impact of excess sugar consumption on dental health, supervised tooth brushing still persists. Studies also reveals that many parents/caregivers were aware about the approaches for preventing caries in children but only few implicate this on their children’s teeth.

The general guidelines for acceptable Guttman Scale as stated by Petersen (1989) was $CR > 0.9$, $MMR < 0.9$, and $CS > 0.6$. Petersen further indicated that a unidimensional and cumulative scale was significant in respect to attitude for prevention of dental diseases whereas the second scale pertaining regarding knowledge about sugar and caries failed on the criteria of CR and CS. ³

In our study, we developed a unidimensional cumulative scale on attitude towards identification and prevention of oral diseases similar to Petersen’s earlier study of 1989 ³ (scale on attitude towards prevention of oral diseases). Further, in our study, we added an exclusive parameter

of attitude towards the maintenance of oral hygiene. Our newly developed scale of attitude fulfills the criteria mentioned by Peterson (1989) to be a validated **Guttman Scale**.

The present study shows a unidimensional cumulative scale on the knowledge of parents/caregivers on oral hygiene measures and their understanding of the consumption of sugar and its impact on dental caries. Our scale on knowledge also fulfills the criteria of the validated **Guttman Scale**.

In our present study, we altered and further added relevant questions of attitude towards identification and prevention of dental diseases as mentioned in Petersen’s study (4 to 10 in number) with an additional parameter of attitude towards maintenance of oral hygiene which was further substantiated in similar studies by Suma Sogi et al ⁴ (2016) and Chand S et al ⁵ (2014).

In our study, we modified the parameters for the knowledge scale. We have taken due considerations regarding the knowledge of parents/caregivers on the oral hygiene measures and their understanding about the consumption of sugar and its impact on dental caries whereas Petersen in his earlier study only assessed the knowledge about sugar and caries which failed on validated Guttman scale’s criteria as it was not unidimensional.

In our study, we assessed the parents/caregivers of children between 6-11 years of age whereas Petersen only examined the parents of 6-year-old Danish children in their study. ³

In our study, people who were in group A had fair knowledge regarding oral hygiene measures and understanding of sugar and its impact on dental caries but their attitude towards prevention of oral diseases was poor. Our results were in tandem with earlier studies of Suma Sogi HP et al ⁴ (2016), and Wakhungu HK et al ²

(2019) where they revealed that in spite of good knowledge among parents, their attitude & practices were lacking. Similarly, People who were in Group B of our study had better knowledge and attitude in comparison to Group A. Our results were in tandem with the study of Sharva V et al ⁶ (2017) that was conducted on rural and urban areas of Bhopal which stated that the prevalence of dental caries was more in urban areas than rural due to more cariogenic diet and easier access to refined sugars & sugar products.

Conclusions

- Our study validated the original study of Petersen et al where both of us have visited and verified GUTTMAN SCALES
- In our study we found that the people who were in group A had fair knowledge about oral hygiene measures and understanding of sugar and its impact on dental caries but their attitude towards prevention of oral diseases were poor.
- Similarly, People who were in Group B of our study had better knowledge and attitude in comparison of Group A.

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