

Treatment needs for dental caries in schoolchildren in Riyadh, Saudi Arabia

A follow up study of the oral health survey

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ABSTRACT

Objectives: To determine the magnitude and severity of treatment needs for dental caries of school children of Riyadh, Kingdom of Saudi Arabia (KSA), 14 years after the conduct of the Oral Health Survey (Phase I) (OHS (I)) in KSA.

Methods: Six hundred and two primary school first graders (primary school (PS)) (5-8 year-old) and 205 intermediate school first graders (intermediate school (IS)) (11-14 year-old) children were randomly selected, using stratified cluster random sampling, from schools of Riyadh, KSA during April 2001 to May 2001. All the children were examined for caries and treatment needs, using the World Health Organization criteria.

Results: Ninety-three percent of PS children required some type of restoration and 36.7% needed extractions. Ninety-five percent of IS children required restorations and approximately one-quarter were needed extractions. Amongst male PS children approximately 7 teeth needed one or more surface

fillings, whereas 6 teeth of female PS children needed the same. Of the male IS children, 6.5 teeth needed one or more surface fillings, whereas 4 teeth of female IS children needed the same. These differences were all statistically significant. On average, one tooth of male children needed extraction, whereas approximately 0.7 teeth of female children needed the same. The difference was also significant. There were significant differences between urban and rural children for various types of treatment needs. However, nationality of the children did not show any significant effects on treatment needs.

Conclusion: The results indicate that the treatment needs for dental caries have increased in schoolchildren of Riyadh significantly 14 years after the conduct of OHS (I).

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A comprehensive study of oral diseases and habits of the people living in the Riyadh region of Kingdom of Saudi Arabia (KSA), known as the Oral Health Survey (Phase I) (OHS (I)), and design matched with the International Collaborative Study I (ICS I), was conducted in 1987, and was published in 1991.¹ As a continuation of this study, another study covering the

rest of the country, except the 2 regions that did not have any large urban areas, known as Oral Health Survey: Phase II (OHS (II)),² again matched with the International Collaborative Study II (ICS II), was organized during 1991-1994. Other countries, involved in these studies (ICS I and ICS II) were Australia, Canada, Federal Republic of Germany, German

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Democratic Republic, Ireland, Japan, Norway, Poland, United States of America, New Zealand, India, and Latvia. Both the Saudi studies were funded by King Abdul-Aziz City for Science and Technology (KACST), KSA, the national research-funding agency. Since OHS (I) was conducted in 1987, almost 14 years ago, a tremendous change has occurred in lifestyle in general and specifically in eating habits of young Saudis, especially in Riyadh, the capital, and the largest urban metropolis of KSA. Therefore, there seems to be a need to conduct another study as a follow up and observe the possible effects of these changes on caries status and treatment needs. Hence, a study was conducted in the Riyadh region among students in the first grade of primary school (PS) (5-8 year-old) and first grade of intermediate school (IS) (11-14 year old) for caries status and treatment needs in 2001. The purpose of this article is to report the results of this study with respect to the treatment needs for dental caries in these children. Several studies have been conducted in different parts of the world to determine the treatment needs among different age groups of children.³⁻¹⁶ In most of the studies, it was observed that restorations (one or more surface fillings) accounted for the greatest percentage of treatment needs compared to extractions, except for some studies from African countries. These studies from African countries showed that treatment needs were not very high and that most of the carious teeth needed extractions.¹⁴⁻¹⁵ Very few studies have been published for KSA on this subject. Younes and El-Angbawi¹⁷ reported that approximately 80% of 12-15 year-old children of Riyadh needed some type of dental treatment. Oral Health Survey (Phase I) showed that a larger proportion of 6 and 12-year-old children required restorations (2.7 and 1.7 teeth per subject) than extractions (less than half a tooth per subject in both groups). A few years later OHS (II) found even higher percentages of restoration needs (3.58 and 2.21 teeth per subject) and extractions than OHS (I) (one and 0.34 teeth per subject). Similarly, Khan¹⁸ and Jasser et al¹⁹ have shown that a very large proportions (approximately 70%) of PS children of the Eastern region of KSA needed one or more surface fillings.

Methods. A random sample of 807 PS first graders IS first graders from urban and rural areas of Riyadh were examined during April 2001 to May 2001. In year 2000, the number of primary boys was 531, primary girls was 533, intermediate boys was 315 and intermediate girls was 281 schools in this region with a number of students attending in these schools being 191938, 192886, 88,671 and 82,662. To determine the sample size for this study, the foregoing student populations and standard deviation of decayed, missing and filled teeth (dmft) mentioned by Shammery et al¹ in OHS (I) were used. The sample size obtained with a 95% confidence interval (CI), an 80% power of the test and maximum error of 0.5 in dmft was 571 for PS and 206 for IS children, These samples were further divided

among public schools of 5 locations (North, South, East, West and Central regions) of the urban area, private schools and rural schools, according to the proportions of students in these types of schools. Thirty-four schools were randomly selected using stratified random sampling. Four schools each (one primary boy, one primary girl, one intermediate boy and one intermediate girl) from each urban location, four private schools (one primary boy, one primary girl, one intermediate boy and one intermediate girl), and 10 rural schools (3 primary boys, 3 primary girls, 2 intermediate boys and 2 intermediate girls) were randomly selected from the lists of schools obtained from Ministry of Education and Presidency of Girls' Education. The stratification was carried out using location and type of schools. The required numbers of students were examined from the selected schools by trained examiners. Two examiners (one male and one female) were trained and calibrated by a senior faculty member of the College of Dentistry, King Saud University, KSA. The same senior faculty member served as one of the reference examiners in the OHS of KSA. Following the training and calibration, a very high degree of agreement (above 92%) for both male and female examiners with the reference examiner was observed, using the Kappa Method. The World Health Organization (WHO) criteria²⁰ was utilized for diagnosis of the caries status and assessment of treatment needs. Selected schools were informed before the visit of examiners. Each child was examined while seated on a portable dental chair. Natural light and disposable mirror heads were used for the examination. The probe was used sparingly on doubtful surfaces. In case of any doubt the tooth was marked sound. No radiographs were taken.

Statistical package for social sciences (Windows version 10.0) was utilized to generate descriptive statistics and inferential tests. The t-test and analysis of variance were used to find out the statistical significance of mean differences between gender (male or female), area (urban or rural), nationality (Saudi or non-Saudi) and urban areas. Chi-square was utilized to find the differences between prevalence of treatment needs among gender, area, nationality and urban location. The significance level was set at 0.05.

Results. The final numbers of pupils examined in the first grades PS (5-8 years) and intermediate schools (IS) (11-14 years) were 602 and 205. The male and female distribution in the PS group was 52-48% and was almost 50% each in the IS group. The mean ages of PS male children were 6.4 ± 0.6 years and IS were 12.9 ± 0.6 years, and for girls mean ages for PS 6.1 ± 0.7 years and IS 12.8 ± 0.7 years. **Table 1** shows the mean treatment needs of PS and IS children, categorized by gender, area and nationality. On average, approximately 7 teeth of male PS children needed one or more surface fillings, while in females approximately 5 teeth needed the same and it was statistically significant ($p < 0.0001$). Approximately one tooth on average of male PS

children was identified for extraction, whereas only 0.7 teeth of female children needed the same and the difference was statistically significant ($p=0.014$). In the IS group, approximately 6.5 teeth of males needed one or more surface fillings, whereas approximately 4 teeth of females needed the same. The difference was statistically significant ($p<0.0001$). In general, urban children have higher treatment needs in almost in all types of treatment. However, for PS urban children, the needs of 2 or more surface fillings, crown and pulp care were statistically significantly greater, while for IS children, only the need for one and 2 or more surface fillings were significantly greater ($p<0.05$). In most of the cases, there was no significant difference between the 2 groups, except in the need for crowns and pulp care treatments, for which Saudi children showed greater needs in both PS and IS groups ($p<0.0001$). **Table 2** shows the treatment needs of PS and IS children from public schools in different locations and from private schools in urban. The children of private school had the lowest need for one surface fillings, which was significantly different from those in public schools in all regions of Riyadh, except the Eastern region. When comparing the 2 or more surface fillings among the regions, the Northern region had the lowest value, but was significantly different only in comparison with the Southern region. When comparing IS children of different locations, the need for crowns and pulp-care had shown zero values for private school children, which were significantly different from the schools located in the Western area. The prevalence of restorative needs (one or more surface fillings; pulp care; crown) and the need for extractions in PS and IS children are summarized in **Table 3**. Ninety-three percent of PS children needed restorations, whereas 36.7% needed extractions. Male children had significantly higher needs for restorations and extractions than females ($p<0.0001$). The need of restoration was significantly greater in urban than rural children ($p=0.024$). Children from schools located in the Northern part of the city showed significantly the lowest need for restorations and extractions as compared to other locations and private schools ($p<0.05$). In IS children, males and urban children showed significantly higher prevalence of restorations and extractions than their female and rural counterparts. In total, 94.6% of the IS children were diagnosed for the need of restorations and 23.4% for extractions.

Discussion. The results of the first phase of the national survey of OHS (I) conducted in 1987, were published in 1991. The present investigation was a follow up of the Riyadh region and the study was carried out after a lapse of 14 years, to determine changes that occurred during this time. In OHS (I), Shammery et al¹ showed that the mean treatment need for fillings for 6-year-old children was 2.7 in Riyadh. The breakdown between urban and rural areas showed that urban children needed 3.1 teeth to be filled, whereas for rural

children it was only 2.3 teeth. In OHS (II), which represents a nationwide survey, the cohort of this age range showed a mean treatment need for fillings of 3.6. The present study found a treatment need for one or more surfaces fillings of 6.1, which represent a more than doubling treatment need for fillings, as compared to both the OHS (I) and OHS (II). In both types of treatment categories, one surface or 2 or more surface fillings, urban children showed higher treatment needs than rural children, which follow the same pattern as the earlier surveys.^{1,2} Furthermore, male children had a significantly greater need for fillings than female children. This finding agrees with Khan¹⁸ and Jasser et al.¹⁹ each of which reported on 2 distinct areas of the Eastern region of KSA. Khan¹⁸ has shown that need for fillings in males and females was 3.9 and 2.5 per subject, while Jasser et al¹⁹ have shown that 76% of males and 63% females needed restorations. Private and Northern public school children showed the lowest need for fillings compared to other regions, especially those in the Southern and Western regions. Besides fillings, other treatment needs such as pulp care, need for crowns and extractions also had the lowest values in Northern region schools, and were significantly different from Western region schools. This may be due to differences in socio-economic status of these areas. The need for pulp cares and crowns have increased manifold during these 14 years, while need for extraction has doubled, as compared to the OHS (I). Among 11-14 year-old (IS), this study showed that approximately 6 teeth required one or more surface fillings. Oral Health Survey (I) and OHS (II) found that 1.7 and 2.2 teeth per subject needed fillings in this age group. Again, this study showed that the need for fillings has increased by more than 3 times in IS children, as compared to 14 years ago. In the present study, urban children had significantly greater need for fillings than rural children, which is not in agreement with OHS (I). It can be suggested that the life style and eating habits have changed in urban areas faster than rural areas. There was no significant difference between Saudi and non-Saudi children in the needs for fillings. This suggests that non-Saudi children follow the same eating habits and life pattern as native children. The needs for pulp-care, crowns and extractions have also increased for this age group during the last 14 years. There was no significant difference between public schools in different urban locations of Riyadh, except between private schools and Western areas schools. It suggests that at this age, the life style and eating habits may become consistent and comparable.

The prevalence of treatment needs in OHS (II) had shown that 80.4% of 6-7 year-old children needed restorative care (one or more surface fillings; pulp-care and crown), whereas 37.7% needed extractions. This study found a slightly greater percentage of restorative need, whereas the need of extractions was almost the same. Khan¹⁸ has shown that the prevalence of fillings and extractions was 75.7% and 15.1%, in Al-Ahsa,

Table 1 - Treatment needs of primary and intermediate schoolchildren categorized by gender, location and nationality.

Treatment needs	Age 5-8 years			Age 11-14 years			Total		
	Gender (M=313; F=289)	Location (U=451; R=151)	Nationality (S=472; NS=130)	Gender (M=103; F=102)	Location (U=148; R=57)	Nationality (S=162; NS=43)	Gender (M=416; F=391)	Location (U=599; R=208)	Nationality (S=634; NS=173)
One surface fillings									
$\bar{x} \pm SD^*$	3.49 ± 2.18	3.18 ± 2.27	3.10 ± 2.23	4.70 ± 3.23	4.17 ± 3.05	3.9 ± 13.06	3.84 ± 2.56	3.45 ± 2.51	3.30 ± 2.49
$\bar{x} \pm SD^\dagger$	2.67 ± 2.27	2.84 ± 2.21	3.11 ± 2.35	3.04 ± 2.55	3.11 ± 2.84	3.74 ± 2.90	2.82 ± 2.35	3.00 ± 2.48	3.27 ± 2.51
p-value	<0.0001	0.106	0.956	<0.0001	0.024	0.754	<0.0001	0.010	0.863
≥2 surface fillings									
$\bar{x} \pm SD^*$	3.54 ± 2.64	3.10 ± 2.64	3.07 ± 2.61	1.78 ± 1.55	1.61 ± 1.54	1.36 ± 1.49	3.20 ± 2.53	2.74 ± 2.51	2.64 ± 2.49
$\bar{x} \pm SD^\dagger$	2.33 ± 2.36	2.55 ± 2.33	2.58 ± 2.43	1.04 ± 1.39	0.89 ± 1.32	1.58 ± 1.62	2.00 ± 2.24	2.24 ± 2.28	2.34 ± 2.30
p-value	<0.0001	0.023	0.059	<0.001	0.001	0.404	<0.0001	0.001	0.159
Crown									
$\bar{x} \pm SD^*$	0.29 ± 0.72	0.62 ± 1.24	0.64 ± 1.22	0.18 ± 0.46	0.37 ± 0.76	0.39 ± 0.77	0.11 ± 0.47	0.14 ± 0.61	0.57 ± 1.13
$\bar{x} \pm SD^\dagger$	0.81 ± 1.41	0.31 ± 0.68	0.19 ± 0.62	0.48 ± 0.86	0.23 ± 0.54	0.12 ± 0.32	0.05 ± 0.07	0.01 ± 0.10	0.17 ± 0.56
p-value	<0.0001	<0.0001	<0.0001	0.003	0.131	0.001	<0.0001	<0.0001	<0.0001
Pulp care									
$\bar{x} \pm SD^*$	0.15 ± 0.49	0.46 ± 1.07	0.49 ± 1.07	0.17 ± 0.44	0.28 ± 0.67	0.31 ± 0.68	0.15 ± 0.48	0.37 ± 0.85	0.45 ± 0.99
$\bar{x} \pm SD^\dagger$	0.71 ± 1.27	0.29 ± 0.68	0.15 ± 0.54	0.35 ± 0.75	0.19 ± 0.48	0.07 ± 0.26	0.56 ± 1.01	0.26 ± 0.64	0.13 ± 0.49
p-value	<0.0001	0.024	<0.0001	0.031	0.351	<0.0001	<0.0001	0.011	<0.0001
Extraction									
$\bar{x} \pm SD^*$	1.03 ± 1.56	0.91 ± 1.65	0.91 ± 1.56	0.54 ± 1.10	0.34 ± 0.89	0.49 ± 1.00	0.91 ± 1.49	0.78 ± 1.53	0.80 ± 1.11
$\bar{x} \pm SD^\dagger$	0.71 ± 1.63	0.77 ± 1.45	0.77 ± 1.76	0.27 ± 0.65	0.60 ± 0.94	0.09 ± 0.29	0.61 ± 1.48	0.73 ± 1.38	0.60 ± 1.56
p-value	0.014	0.357	0.379	0.034	0.077	<0.0001	0.0002	0.702	0.127

*The first row of each treatment need contains the information for male (M), urban area (U) and Saudi (S) children.
†The second row of each treatment need contains the information for female (F), rural area (R) and Non-Saudi (NS) children

Table 2 - Treatment needs of primary and intermediate schoolchildren categorized by gender, location and nationality.

Age groups and geographic location	n	One surface filling $\bar{x} \pm SD^*$	Two or more surface fillings $\bar{x} \pm SD^*$	Crown $\bar{x} \pm SD^*$	Pulp Care $\bar{x} \pm SD^*$	Extraction $\bar{x} \pm SD^*$
5-8 years						
North	61	3.34 ^a ± 2.72	2.36 ^a ± 2.39	0.33 ^a ± 0.83	0.30 ^a ± 0.76	0.38 ^a ± 0.86
South	72	3.43 ^a ± 2.19	3.73 ^b ± 2.99	0.78 ^{ab} ± 1.74	0.36 ^{ab} ± 1.35	0.97 ^{ab} ± 1.34
East	103	3.08 ^{ab} ± 2.13	3.59 ^{ab} ± 2.95	0.54 ^{ab} ± 1.06	0.48 ^{ab} ± 1.03	0.92 ^{ab} ± 1.69
West	65	3.97 ^a ± 2.29	3.00 ^{ab} ± 2.30	1.03 ^b ± 1.40	0.85 ^b ± 1.20	1.37 ^b ± 2.31
Central	66	3.39 ^a ± 2.09	3.05 ^{ab} ± 2.58	0.53 ^{ab} ± 0.92	0.39 ^{ab} ± 0.84	1.15 ^{ab} ± 1.92
Private	84	2.21 ^b ± 1.95	2.62 ^{ab} ± 2.20	0.55 ^{ab} ± 1.22	0.40 ^{ab} ± 1.07	0.70 ^{ab} ± 1.30
Total	451	3.10 ± 2.26	2.96 ± 2.58	0.54 ± 1.14	0.42 ± 0.99	0.88 ± 1.60
11-14 years						
North	23	3.61 ^a ± 2.73	2.04 ^a ± 1.26	0.22 ^{ab} ± 0.52	0.17 ^{ab} ± 0.49	0.30 ^a ± 0.76
South	21	4.67 ^a ± 3.06	1.19 ^a ± 1.54	0.43 ^{ab} ± 0.81	0.29 ^{ab} ± 0.64	0.19 ^a ± 0.40
East	39	4.33 ^a ± 3.26	1.41 ^a ± 1.52	0.54 ^{ab} ± 0.76	0.44 ^{ab} ± 0.68	0.33 ^a ± 0.84
West	21	4.00 ^a ± 2.95	1.71 ^a ± 1.76	0.67 ^b ± 1.28	0.57 ^b ± 1.16	0.57 ^a ± 1.08
Central	22	3.41 ^a ± 2.77	1.82 ^a ± 1.62	0.46 ^{ab} ± 0.10	0.14 ^{ab} ± 0.35	0.14 ^a ± 0.35
Private	22	4.91 ^a ± 3.37	1.59 ^a ± 1.56	0.00 ^a ± 0.00	0.00 ^a ± 0.00	0.50 ^a ± 1.47
Total	148	3.87 ± 3.02	1.41 ± 1.51	0.33 ± 0.71	0.26 ± 0.62	0.34 ± 0.91

Different alphabets show statistical significance

Table 3 - Prevalence of treatment needs among primary and intermediate schoolchildren categorized by gender, area, nationality and geographical location.

Age group (years)	Treatment needed	Gender			Area			Nationality			Geographical location						Total	
		Male %	Female %	p-value	Urban %	Rural %	p-value	Saudi %	Non-Saudi %	p-value	North %	South %	East %	West %	Central %	Private %		p-value
5-8	Restorative	(98.1)	(88.2)	<0.0001	(94.7)	(89.4)	0.024	(93.4)	(93.1)	0.885	(88.5)	(97.2)	(96.1)	(100)	(95.5)	(90.5)	0.027	93.4
	Extraction	(46)	(26.6)	<0.0001	(38.4)	(31.8)	0.147	(37.3)	(34.6)	0.576	(19.7)	(47.2)	(35)	(50.8)	(48.5)	(31)	0.001	36.7
11-14	Restorative	(99)	(90.2)	<0.0001	(98)	(86)	0.001	(95.1)	(93)	0.598	(95.7)	(100)	(100)	(100)	(100)	(90.9)	0.141	94.6
	Extraction	(26.2)	(20.6)	<0.0001	(18.9)	(35.1)	0.014	(27.2)	(9.3)	0.014	(17.4)	(19)	(17.9)	(33.3)	(13.6)	(13.6)	0.593	23.4

KSA. This study showed higher percentages in both the needs of fillings and for extractions. It may be due to the different lifestyle and eating habits in Al-Ahsa and Riyadh. In 12-13 year-old children, the OHS (II) showed the prevalence of the need for restorative-care was 72.6%, whereas the need for extraction was 17.6%. This study showed that only 5% children did not need any restorative care, and more children needed extractions. This study also found a higher percentage of treatment needs than an earlier study from Riyadh¹⁷ and also much higher values than studies from other countries.^{3,6,15,16} The prevalence of restorative needs and extractions is significantly higher in males and urban areas than females and rural children, It may be due to the fact that young Saudi females are more concerned on their general health, especially their oral health as compared to their male counterparts and due to more rapid changes in eating habits in urban areas than rural areas.

In conclusion, this study has found that the treatment needs for carious teeth has increased significantly in the last 14 years since OHS (I) was conducted. The present study provides important information regarding the change in magnitude and severity of treatment needs of PS and IS children after 14 years of the OHS. This information may assist the planning personnel of the health department of Riyadh region to accelerate educational and preventive measures and to determine a better estimate of manpower requirements and material needs.

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References

- Shammery AR, Guile EE, El-Backly M, Lamborne A. An oral health survey of Saudi Arabia: Phase I (Riyadh). General Directorate of Research Grants Programs. King Abdul-Aziz City for Science and Technology, Riyadh (KSA): 1991.
- Shammery AR, Guile EE, El-Backly M, Sulaimani S. Oral health survey of Saudi Arabia 1991-1994. (In press)
- Astroth J, Berg R, Berkey D, McDowell J, Hamman R, Mann J. Dental Caries prevalence and treatment need in Chiriqui Province, Panama. *Int Dent J* 1988; 48: 203-209.
- Zerfowski M, Koch MJ, Niekusch U, Staehle HJ. Caries prevalence and treatment needs of 7 to 10-year-old school children in South western Germany. *Community Dent Oral Epidemiol* 1997; 25: 348-351.
- Freire MC, Pereira MF, Batista SM, Borges M, Barbosa MI, Rosa AG. Prevalence of dental caries and treatment needs in 6 to 12 year-old schoolchildren at public schools. *Rev Saude Publica* 1999; 33: 385-390.
- Alvarez-Arenal A, Alvarez-Riesgo JA, Pena-Lopez JM, Fernandez-Vazquez JP. DMFT, dmft and treatment requirements of schoolchildren in Asturias, Spain. *Community Dent Oral Epidemiol* 1998; 26: 166-169.
- Lo EC, Jin LJ, Leung WK, Corbet EF. Oral health status and treatment need of 11-13 year-old- urban children in Tibet, China. *Community Dent Health* 2000; 17: 161-164.
- Mandal KP, Tewari AB, Chawla HS, Gauba KD. Prevalence and severity of dental caries and treatment needs among population in the Eastern states of India. *J Indian Soc Pedod Prev Dent* 2001; 19: 85-91.
- Kulkarni SS, Deshpande SD. Caries prevalence and treatment needs in 11-15 year old children of Belgaum city. *J Indian Soc Pedod Prev Dent* 2002; 20: 12-15.
- Rodrigues JS, Damle SG. Prevalence of dental caries and treatment need in 12-15 year old municipal school children of Mumbai. *J Indian Soc Pedod Prev Dent* 1998; 16: 31-16.
- Retna KN. Assessment of dental treatment required and analysis of cost in the management of dental caries among semiurban primary school children of Kerala. *J Indian Soc Pedod Prev Dent* 2000; 18: 29-37.
- Rodrigues JS, Daamle SG. An epidemiological study on the prevalence of dental caries and treatment need in 12-15 year-old children in Bhiwandi (Maharashtra). *J Indian Soc Pedod Prev Dent* 1998; 16: 84-89.
- Laloo R. A comparison of dental caries status by surface and treatment needs of 5-7 years old children in Tanzania, Uganda and Mozambique. *Odontostomatol Trop* 1998; 21: 12-15.
- Adegbembo AO, El-Nadeef MAI, Adeyinka A. National survey of dental caries status and treatment needs in Nigeria. *Int Dent J* 1995; 45: 35-44.
- Mosha HJ, Ngilisho LAF, Nkwere H, Scheutz F, Poulsen S. Oral Health status and treatment needs in different age groups in two regions of Tanzania. *Community Dent Oral Epidemiol* 1994; 22: 307-310.
- Smith AC, Lang WP. CPITN, DMFT, and treatment requirements in a Nicaraguan population. *Community Dent Oral Epidemiol* 1993; 21: 190-193.

17. Younes SA, El-Angbawi MF. Dental caries prevalence in intermediate Saudi schoolchildren in Riyadh. *Community Dent Oral Epidemiol* 1982; 10: 74-76.
18. Khan NB. Treatment needs for dental caries in pre- and early schoolchildren in Al-Ahsa, Saudi Arabia. *JPDA* 2002; 11: 191-194.
19. Jasser N, Khalid A, Ahmed YM, Ibrahim BT, Latif A, Oluyadi BA. Normative dental treatment needs among primary school children in Jubail, Saudi Arabia. *Saudi Med J* 1999; 20: 382-385.
20. World Health Organization (WHO). Oral health surveys. Basic Methods. 3rd ed. Geneva: WHO; 1987.

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Title: Vaccination against dental caries: Present trends
Source: Saudi Med J 1987; 2: 128-131

Abstract

Many attempts have been made in the past to produce a suitable caries vaccine for clinical trials in humans. Several cell wall antigens of streptococcus mutants were utilized in animal vaccination. Antigen 1/11 was found to be the most protective antigen with regard to dental caries; however, it cross-reacted with heart muscle. Using monoclonal antibodies, the cross-reactive part has been separated from the protective antigen, enabling a human vaccine to be made available for clinical trials.