

Medical and dental health status of orphan children in central Saudi Arabia

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ABSTRACT

الأهداف: تقييم الحالة الطبية والسنية للأطفال الأيتام والذين تتراوح أعمارهم ما بين 4-12 عام ومقارنتها بحالة الأطفال الذين يعيشون مع والديهم.

الطريقة: أجريت هذه الدراسة التحليلية المقطعية في ثلاث دور أيتام حكومية وثلاثة مدارس عادية في مدينة الرياض في المملكة العربية السعودية من شهر يوليو 2011م وحتى شهر يناير 2012م. تمت مشاركة جميع الأيتام من عمر 4-12 سنة (90 يتيم وبتيمة). كما اختير 90 طفل وطفلة يعيشون مع والديهم عشوائيا كعينة ضابطة. تم الحصول على معلومات الأطفال والتاريخ الطبي والسني عن طريق استبيانة تمت تعبئتها بواسطة الامهات البديلات وأمهات الأطفال. تم الكشف على جميع الأطفال وتم تسجيل مؤشر التسوس كما تم تسجيل مؤشر نظافة الفم ومؤشر ترسب البلاك ومؤشر التهاب اللثة. تمت معالجة البيانات احصائيا باستخدام اختبارات بيرسون و مان ويتني و كرسكال والس .

النتائج: أظهرت النتائج أن 36% من الأيتام يعانون من مشاكل صحية مقارنة بـ 14.4% من العينة الضابطة. العينة الضابطة قامت بزيارة طبيب الأسنان أكثر من الأيتام $p < 0.001$. حوالي 96% من الأيتام لديهم تسوس أسنان مقارنة بـ 90% من العينة الضابطة $p < 0.001$. كما أن مؤشر التسوس للأسنان الدائمة كان أعلى في الأطفال الأيتام $p = 0.004$. كان مؤشر ترسب البلاك أعلى في عينة الدراسة $p = 0.009$ وكذلك مؤشر التهاب اللثة $p = 0.002$ ، مؤشر حالة نظافة الفم أعلى عند الأيتام $p < 0.001$ مقارنة بالعينة الضابطة.

خاتمة: الحالات المرضية كانت أكثر لدى الأيتام الذين يعيشون في الدور الحكومية بالرياض لكنهم يحصلون على رعاية طبية جيدة ومتواصلة بينما تسوس الأسنان كان لديهم أكثر وحالة نظافة الفم كانت أسوء لديهم حيث أنهم لا يحصلون على الرعاية السنية إلا في الحالات الطارئة.

Objectives: To evaluate the medical and dental health status of orphan children from 4 to 12-years-old, and compare them with children living with their parents.

Methods: This analytical, cross-sectional study took place in 3 government orphanages and 3 ordinary schools in Riyadh, Saudi Arabia from July 2011 to January 2012. All orphans aged 4-12 year were selected (N=90). Ninety children living with their parents were selected randomly to serve as the controls.

Demographic data, medical, and dental history were obtained through a questionnaire answered by the orphans' foster mothers and childrens' parents. The study groups were examined to evaluate their caries status using the Decayed-Missing and-Filled Teeth/Surface indices (DMFT/DMFS) for permanent teeth and (dmft/dmfs) for primary teeth. Oral hygiene status (OHI), plaque deposition (PI), and gingival health (GI) were also assessed. Pearson Chi-square, Mann-Whitney, and Kruskal-Wallis tests were used for statistical analysis.

Results: Approximately 36% of the orphans had medical conditions compared to 14.4% of the control children. The control children visited the dentist more than the orphans ($p < 0.001$). Approximately 96% of the orphans had dental caries compared to 90% of the control children ($p < 0.001$). Decayed-missing and-filled teeth/surface index scores were higher among orphans ($p = 0.004$) compared to the control children ($p < 0.001$). Orphans scored higher in PI ($p = 0.009$), GI ($p = 0.002$), and OHI ($p < 0.001$).

Conclusion: Medical health conditions were more prevalent among orphans living in government orphanages, but they were provided with good and continuous medical care. However, they had more dental caries and worse oral hygiene, as dental care was provided to them only in case of emergency.

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Early identification of high-risk groups and the implementation of preventive and educational programs on health could help in preventing and controlling diseases during their early stages. One of the known high-risk groups is the orphans. An orphan is a child who has lost one or both parents. By this definition, there were over 132 million orphans in sub-Saharan Africa, Asia, Latin America, and the Caribbean in 2005.¹

In Islam, this definition is expanded to include children of unknown parentage. Children of unknown parentage who do not know their mother and father, and are deprived of the warmth of natural family environments are also orphans.² Actually, that is an extreme case of orphanhood because in language and terminology an orphan is one who lost his/her father, but the unknown parentage is one who has no known father, mother, brother, sister, or any relatives.

The government of the Kingdom of Saudi Arabia (KSA) complies with the definition of orphans in Islam and shows considerable care to them. The system of caring and bringing them up has various forms. The known orphans are usually hosted by their extended families, while the unknown parentages are hosted in government orphanages or by host families under the supervision of the Ministry of Social Affairs.³ In 2010-2011, orphans who were hosted in government orphanages all over KSA reached 1358 in number.³ All orphans who live in these orphanages receive social, psychological, medical and educational care.³ In Riyadh, KSA, there are 4 orphanages that are associated with the Ministry of Social Affairs. Three of them house children from birth to 12 years, and the fourth one cares for male orphans older than 12 years old. Each of the 3 orphanages for younger children has either a mini-villa or a small flat where 4-6 orphans live together. Each villa or flat has a Saudi female employee that takes care of the orphans, and who is considered as the foster mother. The foster mother and the 4-6 orphans represent a family. Each "family" living in a villa or flat receives the same quality of care. Orphan children eat 3 meals and one snack per day and go to government schools. All orphanages have small clinics and a physician that keeps track of the medical files and medicines. Medical and dental health status reflects the level of care that the child has received. Many studies have been conducted to

investigate the medical and dental health status among children in KSA.⁴⁻⁷ However, few published studies are available regarding the medical and dental health status of orphans all over the world with only one published study in Saudi Arabia.⁸⁻¹¹ Better level of dental health in comparison to other studies in KSA was found in selected orphan children of 4 to 6-year-olds living in Jeddah.¹¹ Children living in children's houses miss their families. They do not know parental love, have many problems, and do not acquire models necessary for their adult life.¹² Lack of family support might influence the children's health behavior; which may also be influenced by other factors. Acquiring information on the medical and dental health status of orphan children will help to provide a better understanding of the medical and dental health problems of an overlooked segment of the society. It will also help in preventing and determining the treatment needs that suit this population.

The aim of this study was to evaluate the medical and dental health status of orphans, 4-12 years old, living in government orphanages in Riyadh, and to compare them with the status of children who live with their parents.

Methods. Approval of the study was obtained from the Ethical Committee of the College of Dentistry Research Center at King Saud University (Reg. No. NF2259). Official letters were sent to the Ministry of Social Affairs and the Ministry of Education to explain the aim of the study and to obtain their authorization for data collection from their orphanages and schools.

This analytical, cross sectional study took place in government orphanages and ordinary schools in Riyadh, KSA from July 2011 to January 2012. All 3 orphanages located in Riyadh housing orphan children were included in the study. All orphans aged 4-12 years with permanent residency in these orphanages were included. They were 90 in numbers. Three schools in the same location of the orphanages were also selected (nursery school, girls primary school, and boys primary school). Ninety children with permanent residency with their parents were selected randomly from these schools to serve as the control group according to the age and gender distribution of the orphan group. Informed consents of parents and orphanage authorities were obtained before the subjects were included in the study. The children's demographic data, medical, and dental history were obtained through a questionnaire that was answered by the foster mothers and parents. The children were examined by one examiner and the data were recorded by one surveyor on a form especially designed for the study. Intra-oral examination was

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performed while the child was in a supine position using a penlight, disposable examination instruments (plastic mouth mirror, explorer, and cotton pliers), and personal protective barriers (gloves and masks). The caries status of the teeth was scored according to the criteria of the World Health Organization (WHO) using the indices of “Decayed-Missing and-Filled Teeth/Surfaces” (DMFT/DMFS) for the permanent teeth and, the “decayed-missing and-filled teeth/surfaces” (dmft/dmfs) for the primary teeth.¹³ The oral hygiene index (OHI) described by James et al,¹⁴ was utilized in this study to assess the oral hygiene status. Plaque deposition was recorded using the Loe¹⁵ Plaque index (PI). The gingival health status was assessed using the gingival index (GI) described by Nanda.¹⁶ To determine the intra-examiner reliability, the examiner re-examined 20 (11.1%) randomly selected children for OHI, PI, GI, and caries scoring.

The data were analyzed using the Statistical Package for Social Sciences (SPSS) program for Windows (version 16 SPSS Inc., Chicago, IL). Kappa test was used to assess the intra-examiner reliability. Simple descriptive statistics (percentage and frequency) of different variables were assessed. Pearson Chi-square test was used to analyze the data of medical and dental history. Non parametric tests (Mann-Whitney and, Kruskal-Wallis) were used to analyze DMFT/DMFS, dmft/dmfs, OHI, PI, and GI scores as the data were not normally distributed. A $p < 0.05$ was considered to be significant.

Results. For OHI, PI, GI, and caries scoring, Kappa test showed an intra-examiner reliability ranging between 0.89 and 0.97. Approximately 38% of the children were 10 years and above. Over 3 quarters of the study groups were boys (Table 1). Regarding the medical history, approximately 36% of the orphan children had chronic medical conditions as compared to only 14.4% of the control children ($p < 0.001$) (Table 2). Asthma and psychological problems were the most common medical

conditions among orphans. Table 2 also shows that 30% of the orphans were having regular medical checkups by their physicians due to their chronic medical conditions as compared to approximately 6% of the control children ($p < 0.001$) and 24.4% of the orphans were currently taking medications as compared to nearly 7% of the control children ($p < 0.001$). In relation to dental history, statistically significant differences were found between the orphan and control children in regards to the dental visits and tooth discoloration. The control children visited the dentist more than the orphans ($p < 0.001$), while orphans experienced more tooth discoloration than the control children ($p = 0.003$) (Table 3).

The caries prevalence among the orphans was higher. Approximately 96% of orphans had dental caries as compared to 90% of the control children ($p < 0.001$). The mean DMFT (2.80 ± 2.12) and DMFS (3.49 ± 3.31) scores also were higher among orphans as compared to the control children ($p = 0.004$ and $p < 0.001$) (Table 4). No statistically significant differences were found in the mean dmft and dmfs scores between the 2 groups. However, when the components of DMFS and dmfs were separated, decayed components (D and d) were

Table 2 - Distribution of the study groups according to their medical health status, medical conditions, medical checkups, and current medications.

Medical Health	Orphans n=90 n (%)	Control n=90 n (%)	P-value [*]
Healthy	58 (64.5)	77 (85.6)	0.001
Diseased	32 (35.5)	13 (14.4)	
<i>Chronic medical conditions</i>			
Asthma and allergy	12 (13.3)	13 (14.4)	
Psychological problems	8 (8.8)	0 (0.0)	
Autism and ADHD	4 (4.4)	0 (0.0)	
SHV problems	6 (6.6)	0 (0.0)	
Epilepsy	1 (1.1)	0 (0.0)	
Mental retardation	2 (2.2)	0 (0.0)	
Others	9 (10)	0 (0.0)	
Medical check ups	27 (30.0)	5 (5.6)	0.001
Medications	22 (24.4)	6 (6.7)	0.001

ADHD - attention deficit hyperactivity disorder, SHV - speech, hearing, and visual problems, *Pearson chi-square test

Table 1 - Distribution according to the age and gender of the study groups.

Group	Orphans (n=90)		Control (n=90)		Total (n=90)	
	n	(%)	n	(%)	n	(%)
<i>Age</i>						
4-6	25	(27.8)	26	(28.9)	51	(28.3)
7-9	31	(34.4)	30	(33.3)	61	(33.9)
10-12	34	(37.8)	34	(37.8)	68	(37.8)
<i>Gender</i>						
Male	69	(76.7)	69	(76.7)	138	(76.7)
Female	21	(23.3)	21	(23.3)	42	(23.3)

Table 3 - Dental history of the study groups.

Group	Orphans n=90 n (%)	Control n=90 n (%)	P-value [*]
Dental visit	39 (34.3)	73 (81.1)	0.001
Toothache	33 (36.7)	25 (27.8)	0.202
Tooth discoloration	9 (10.0)	0 (0.0)	0.002 [†]
Bleeding gum	18 (20.0)	13 (14.4)	0.324

*Pearson chi-square test, †Fisher's exact test

Table 4 - Mean, standard deviation, and sum of rank of DMFT, DMFS, dmft, and dmfs scores for the study groups.

Group	Orphans			Control			P-value*
	Mean	Standard deviation	Sum of rank	Mean	Standard deviation	Sum of rank	
DMFT	2.80	2.12	9117.5	1.99	2.29	7172.5	0.004
DMFS	3.49	3.31	9428.5	1.97	2.62	6861.5	0.001
dmft	2.90	2.51	8076.0	3.23	3.20	8214.0	0.842
dmfs	4.72	5.04	8096.0	5.51	7.36	8194.0	0.887

DMFT - Decayed-Missing-Filled Teeth, DMFS - Decayed-Missing-Filled Surfaces for permanent teeth, dmft - decayed-missing-filled teeth, dmfs - decayed-missing-filled surfaces for primary teeth. *Mann-Whitney test

Table 5 - Mean, standard deviation, and sum of rank of DMFS and dmfs scores by components for the study groups.

Group		Orphans			Control			P-value*
		Mean	SD	Sum of rank	Mean	SD	Sum of rank	
DMFS	D	3.18	2.70	10292.5	0.9	2.10	5997.5	0.001
	M	0.11	0.74	8235.0	0.0	0.00	8055.0	0.156
	F	0.23	1.55	6778.0	1.12	1.66	9512.0	0.001
dmfs	d	3.80	4.17	9625.5	2.03	4.13	6664.5	0.001
	m	0.83	2.25	8211.5	1.27	4.87	8078.5	0.756
	f	0.09	0.41	6507.5	2.67	5.97	9782.5	0.001

D - decayed permanent teeth, M - missing permanent teeth, F - filled permanent teeth, d - decayed primary teeth, m - missing primary teeth, f - filled primary teeth. *Mann-Whitney test, DMFS - Decayed-Missing-Filled Surfaces, dmfs - decayed-missing-filled surfaces

Table 6 - Mean, standard deviation, and mean rank of plaque index (PI), gingival index (GI), and oral hygiene index (OHI) of the study groups.

Group		Orphans (n=90)					Control (n=90)				P-value*	
		n	(%)	Mean	SD	Mean Rank	n	(%)	Mean	SD		Mean Rank
PI	Free	2	(2.2)				8	(8.9)				0.009
	Mild	45	(50.0)	1.5	0.54	99.41	55	(61.1)				
	Moderate	43	(47.8)				25	(27.8)	1.2	0.63	81.59	
	Heavy	0	(0)				2	(2.2)				
GI	No	3	(3.3)				27	(30.0)				0.002
	Mild	83	(92.2)	1.0	0.28	99.55	54	(60.0)	0.8	0.60	81.45	
	Moderate	4	(4.4)				9	(10.0)				
OHI	Good	6	(6.7)				36	(40.0)				0.001
	Fair	68	(75.6)	2.1	0.48	103.97	47	(52.2)	1.7	0.61	77.03	
	Poor	16	(17.8)				7	(7.8)				

*Kruskal-Wallis test

found to be more among the orphans (D=3.18±2.7 and d=3.8±4.17) than the control children (D=0.9±2.1 and d=2.03±4.13) and this difference was found to be statistically significant ($p<0.001$ and $p<0.001$) (Table 5). Conversely, the filled components (F and f) were more among the control children (F=1.12±1.66 and f=2.67±5.97) as compared to orphans (F=0.23±1.55 and f=0.09±0.41) and the difference was found to be statistically significant ($p<0.001$ and $p<0.001$).

Most children in both groups had mild to moderate plaque accumulation. However, orphans had a higher mean PI (1.5±0.54) as compared to the control children (1.2±0.63) ($p=0.009$) (Table 6). Most of the children also had mild gingivitis; although orphans scored

higher mean GI scores (1±0.28) ($p=0.002$). Gingival index scores were found to be correlated to PI scores; as children with high mean GI scores had the highest mean PI scores and those with lowest mean GI scores had the lowest mean PI scores. Table 6 also shows that the overall oral hygiene status was fair in both groups but orphans scored a higher mean OHI (2.1±0.48) as compared to the control children (1.7±0.61) ($p<0.001$).

Discussion. This study provided information on the medical and dental health status of 4 to 12-year-old orphans living in Riyadh, Saudi Arabia. Orphans had more medical conditions, checkups, and medications as compared to the control group. This might be related to

the availability of good medical care as each orphanage had a small clinic and a general physician that attended to the medical health needs of the orphans. This helped in the early diagnosis and treatment of any medical condition and kept track of the orphans' medical files and medicines regularly. In addition, the control children were selected from ordinary schools not including medically compromised children who attend special schools. This might have lowered the number of children with medical conditions in the control group as compared to the orphan group. However, the distribution of medical conditions among the 2 groups revealed that asthma and allergy were almost distributed evenly between them, indicating the high prevalence of asthma among Saudi children as reported by Al Frayh et al.¹⁷ On the contrary, the distribution of psychological and other related problems among orphans was higher than control children, which is in accordance with the result of Fawzy and Fouad.¹⁸ A higher percentage of the control group visited the dentist as compared to the orphan group as orphans visited the dentist for emergency care only (trauma or severe pain). This reflected the lack of dental awareness in the orphanage institutes on the importance of regular dental visits as compared to the medical awareness. Orphans experienced more tooth discoloration which might be related to the increased caries level and to their worse oral hygiene or to the increased exposure to falls and fights which resulted in dental trauma and subsequent teeth discoloration.

Although caries prevalence was higher among orphans (96%) as compared to the control (90%), the present study shows that the caries prevalence was generally high among both groups and was comparable to the findings of other previous studies.^{19,20} However, the mean DMFT score of the orphan group was 2.80 (\pm 2.12), which was higher than the findings of Al-Majed²¹ who reported a mean DMFT score of 2.44 among 8 to 10-year-old Saudi females, and AlBanyan et al²² who found the mean DMFT value to be 2.0 among 5 to 12-year-old Saudi children. On the other hand, the mean DMFT score of the control group was 1.99 (\pm 2.29) which was found to be comparable to the findings of previous studies.^{21,22} In regards to dmft, both groups scored lower dmft than reported previous studies.^{19-21,23} The DMFT score was higher among the orphan group as compared to the control group, which might be related to their poor oral hygiene status. Underlying medical conditions, particularly psychological problems and the use of medications might also have an effect on the increased DMFT score in orphan children. The decay component was the major part of the DMFS and

dmfs indices for the orphan group, which indicates a higher percentage of untreated caries and a greater need for dental treatment. The mean dmfs value of the control group was found to be higher as compared to the orphan group. However, by assessing the components of the dmfs index, it was found that the "d" component was significantly higher among the orphan group and the "f" component was significantly higher among the control group, showing that they have received more dental treatment as compared to the orphans who only received treatment in emergency cases. This finding agrees with the result of a study in Mexico City which revealed that approximately 90.7% of the studied orphan population presented with caries. They explained that the orphans did not receive appropriate dental services as they visited the dentist only when they had pain or some serious dental problem.⁸ Furthermore, Viric et al,⁹ reported that orphans are at higher risk for dental caries due to a lower IQ level, parent deprivation, and institutionalization. On the other hand, a previous study in Jeddah, Saudi Arabia, found lower caries prevalence among orphans living in an institution. They justified that the lower caries levels among these children may partly be attributed to the effectiveness of strict dietary control and regular oral hygiene measures.¹¹ The orphan group had significantly worse oral hygiene, a higher plaque and GI scores as compared to the control group. These results are in agreement with previous studies, which showed that orphans have worse oral hygiene than children living with their parents.^{8,10} The lower level of oral hygiene in orphan children might be attributed to ineffective brushing techniques and to the lack of close supervision. The control group might have more supervised and/or assisted brushing as compared to the orphan group. In addition, the control group visited the dentist more frequently where they might have received advice on preventive oral health care and instructions on how to brush their teeth properly. Based on the results of the present study, there is an apparent need for dental health programs to target this segment of the population in order to improve their oral health status and prevent oral diseases. The government should also focus on providing orphans with regular dental check ups through small dental clinics in the orphanages and a dentists that can follow up and treat these children as needed. In addition, employees taking care of the orphans need to be aware of the importance of oral health care and its role in the overall wellbeing of the individual and could also benefit from the dental health programs. This could be carried out by providing them with instructions and demonstrations on how to help the children take care of their teeth and emphasize the

importance of effective supervision for these children. The number of orphans included in this study was all the orphans housed in the 3 government institutions in Riyadh, Saudi Arabia. Further studies including a larger sample size from orphanages in different parts of the Kingdom should be conducted. In addition, other orphans who are hosted by host families should be included for the sake of comparison.

In conclusion, orphan children living in government orphanages in Riyadh, Saudi Arabia had more medical health conditions compared to children living in their own homes with their parents but were provided with good and continuous medical care. However, the dental health conditions were worse among the orphans as noted by the presence of higher levels of untreated carious lesions, and lower levels of filled teeth. Orphans also had worse oral hygiene, a higher plaque index score, and a higher GI score as compared to the control group, and they visited the dentist for emergency care only.

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