Determinants of the First Dental Visit in a Group of Sudanese Children

By
Malaz Mohamed ELrafie Mustafa Salih
B.D.S (U of K) 2003

A thesis submitted in partial fulfillment for the requirements of the
Degree of M.Sc. (Sudan) in Pediatric Dentistry

Supervisor:
Dr. Fatma EL-khidir EL-Hassan
BDS (Sudan), M.Sc. (Norway)

2011
Declaration

I declare that this work is original and that it is done as partial fulfillment of M.sc degree in Pediatric Dentistry according to the Guidelines of the University of Khartoum Graduate Collage of Medical and Health Sciences Board. This work has not been submitted elsewhere.
Dedication

For my family, who offered me unconditional love, support and prayers throughout the course of this thesis; my dear father, Mr. Mohamed Elrafie, in the first place who put the fundament my learning character, showing me the joy of intellectual pursuit ever since I was a child.

This effort is also dedicated to my mother, Rawia, who taught me that even the largest task can be accomplished if it is done one step at a time.

To my beloved sisters Maadoun, Maysa and Samah, and my dear brothers Mustafa and Mutamad for their constant love and support.

To the soul of my dear ante, Mama Fatima, may her soul rest in peace.

To my dear mother-in-low, Zeinab, who supported me patiently and willingly, without whom I would never completed my post graduation studies.

Words fail me to express my appreciation to my dear husband, Alsadig whose dedication, love and persistent confidence in me, has taken the load off my shoulder and who remained willing to engage with the struggle and ensuing discomfort, of having a partner who refuses to accept the given role of the "woman". Without you lifting me up when this thesis seemed interminable, I doubt it should ever have been completed.

To my two angles; Akram and Mohamed, my internal peace and pride.

May God watch over you all for me.

With all my love

Malaz
CHAPTER ONE

INTRODUCTION AND LITERATURE REVIEW
CHAPTER TWO

MATERIAL AND METHODS
CHAPTER THREE

RESULTS
CHAPTER FOUR

Discussion

Conclusion

Recommendations

References

Appendices
# List of contents

<table>
<thead>
<tr>
<th>Contents</th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chapter One</strong></td>
<td></td>
</tr>
<tr>
<td>1.1 Introduction</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Literature Review</td>
<td>4</td>
</tr>
<tr>
<td>1.2.1 Importance of the first dental visit</td>
<td>4</td>
</tr>
<tr>
<td>1.2.2 Ideal age for the first dental visit</td>
<td>5</td>
</tr>
<tr>
<td>1.2.2.1 Recommendations</td>
<td>5</td>
</tr>
<tr>
<td>1.2.2.2 Studies</td>
<td>7</td>
</tr>
<tr>
<td>1.2.3 Factors influencing early dental care</td>
<td>11</td>
</tr>
<tr>
<td>1.2.4 Organization of the child’s first dental visit</td>
<td>16</td>
</tr>
<tr>
<td>1.2.5 Definition of dental home</td>
<td>18</td>
</tr>
<tr>
<td>1.2.6 Reasons for seeking dental care at the first dental visit</td>
<td>21</td>
</tr>
<tr>
<td>1.2.6.1 Early Childhood Caries (ECC)</td>
<td>21</td>
</tr>
<tr>
<td>1.2.7 Variables influencing children’s dental behaviors</td>
<td>23</td>
</tr>
<tr>
<td>1.2.7.1 Maternal anxiety</td>
<td>24</td>
</tr>
<tr>
<td>1.2.7.2 Medical History</td>
<td>25</td>
</tr>
<tr>
<td>1.2.7.3 Awareness of the dental problem</td>
<td>26</td>
</tr>
<tr>
<td>1.2.8 Dental anxiety scales used in children</td>
<td>26</td>
</tr>
<tr>
<td>1.3 Justification of the study</td>
<td>31</td>
</tr>
<tr>
<td>1.4 Objectives of the Study</td>
<td>32</td>
</tr>
<tr>
<td><strong>Chapter Two</strong></td>
<td></td>
</tr>
<tr>
<td>2. Materials and methods</td>
<td>33</td>
</tr>
</tbody>
</table>
Chapter three
3. Results .................................................................44
   3.1 General Characteristics of the Sample .........................44
   3.2 Age of the children at the first dental visit ..................46
   3.3 Chief Complaint at the first dental visit ......................49
   3.4 Anxiety level at the first dental visit ..........................51
   3.5 Treatment needed at the first dental visit ....................53

Chapter four
Discussion .............................................................56
Limitations of the study ..............................................60
Strengths of the study ...............................................60
Conclusion .................................................................62
Recommendations ..........................................................63
References .........................................................................65
Appendix (I) Interview & clinical examination form ..................80
Appendix (II) خطاب للسيدة/ عميد كلية طب الأسنان/رئس مجلس أبحاث الكلية 84
ACKNOWLEDGEMENT

First of all, thanks to My Lord Allah, the Most Gracious, the Most Merciful for guiding me through my life.
I would like to take the opportunity to thank those people who spent their time and shared their knowledge for helping me to complete my thesis with the best possible result: my supervisor, Dr. Fatma E. El-Hasan for her persistent support, encouragement and patience. My teachers, Dr. Magda M. Mutwakkil, Dr. Randa M. Fatah Al-Rahman, Dr. Azza Tagelsir and Dr. Amel Mudawi, whose encouragement, guidance and support from the initial to the final level enabled me to develop an understanding of the subject.
I highly acknowledge the unlimited support provided by the Faculty of Postgraduate studies, University of Khartoum (U of K) during my study. My appreciation also goes to Dr. Nadia Ahmed Yahia, Dean, Faculty of Dentistry U of K for the unusual support and enthusiasm in guiding me throughout my career as a teaching assistant and a postgraduate student.
I am also thankful to my colleagues in the Dept. of Pediatric Dentistry, especially my patch, Drs. Zainab, Aisha, Rukaya, Sara and Shihab, for being a harmonious team during our postgraduate study.
I also offer my regards and blessings to all of those who supported me in any aspect during the completion of the project.
I would like to express my humble gratitude to the members of the statistics department, School of Mathematical science U of K, for their uninterrupted support during the data analysis process of this research. I am heartily thankful to my husband Mr. Alsadig Osman for his constant technical support and help.

Malaz M. ElRafie
Abbreviations

AAP                     American Academy of Pediatrics.

AAPD                  American Academy of Pediatric Dentistry.

CI                      Confidence Interval.

DPT                  Dental Panoramic Tomography.

ECC                      Early Childhood Caries.

FBRS                  Frankl Behavior Rating Scale.

KDTH             Khartoum Teaching Dental Hospital.

MCH                      Maternal and Child health.

NHANES II      National Health and Nutrition Examination Survey.

OR                      Odd Ratio.

SE                      Standard Error.

U of K                 University of Khartoum.
Abstract

Background: Over the past several years, much discussion has centered on the age at which a child without identified dental problems should first visit a dentist. Several dental professional organizations have offered a strong rationale for making that first visit by age 1 year.

Design: The study is a descriptive, cross-sectional, dental-hospital based study. Settings: The Pediatric Dental Clinics at Khartoum Teaching Dental Hospital & University of Khartoum (which are the major public pediatric dental clinics in Khartoum city).

Objectives: Are to assess the determinants of the first dental visit in terms of age, chief complaint(s), treatment needed and anxiety level in a group of Sudanese children.

Methods: A representative sample of 215 Children who attended the two pediatric dental clinics was targeted. Data were collected prospectively between February to May 2010. A written questionnaire was completed by direct interview of the parents/or caregivers, followed by clinical examination for the chief complaint(s), during which the child’s behavior was rated using the Frankl Behavior Rating Scale(FBRS). Radiographs; periapical
views and DPTs, were taken whenever needed to confirm diagnosis of the chief complaint and to determine the treatment needed accordingly. The various chief complaints were categorized as follows, Orientation and prevention, Dental caries, Deposits / bad breath, Trauma, Pain/ sensitivity, Malocclusion, Missing / extra tooth, Soft tissue lesions, Swelling, Discoloration and Others. When dental caries was the chief complaint, it was further combined with other parameters (pain and/or swelling) to clarify its extent as follows; ‘dental caries (without pain or swelling), ‘dental caries with pain’, ‘dental caries with swelling’ and ‘dental caries with pain and swelling’.

**Results:** the median age for the first visit was found to be 7.08 years. Most common chief complaint for the visit was dental caries (74.42 %), of which dental caries and pain constituted the majority (44.65 %). Most of the children expressed Frankl level 3 (positive) during the clinical examination (57.21%). Extraction was found to be the treatment needed for almost half of the children at their first dental visit (46.98%).

**Conclusion:** Sudanese children are brought very late to the pediatric dental clinics for the first time complaining mainly of
caries and pain which necessitates invasive dental procedures (mostly extraction). The behavior rating during examination was found to be mostly Frankl 3.
المستخلص

خلفية: خلال السنوات الماضية تطرقت العديد من النقاشات العلمية في مجال طب الأسنان إلى العمر المناسب لزيارة الطفل لطبيب الأسنان بدون سبب مرضي محدد. قدمت العديد من المنظمات المتخصصة أسبابًا منطقية لجعل الزيارة الأولى لطبيب الأسنان في عمر 1 سنة. تصميم البحث: البحث عبارة عن دراسة وصفية مقطعية مستخلصة من حالات تردد على مستشفيات الأسنان.

مكان إجراء البحث: ممثلت العينة بـ 215 طفل، من الذين حضروا إلى عيادات طب أسنان الأطفال في كل من مستشفى الأسنان التعليمي – الخرطوم وكلية طب الأسنان – جامعة الخرطوم (والذين يمثلان عيادات طب الأسنان الحكومية الرئية في مدينة الخرطوم).

الأهداف: تقييم محددات الزيارة الأولى لطبيب أسنان الأطفال من حيث عمر الطفل، الداعي الرئيسي إلى الزيارة، نوع العلاج الذي يحتاج إليه الطفل تبعًا لنوع الشكوى ومعدل فقلم مجموعة الأطفال السودانيين عند زياره طبيب أسنان الأطفال للمرة الأولى.

الأساليب: تم جمع البيانات في الفترة من فبراير حتى مايو 2010. تم تصميم إستبيان لجمع البيانات والذي تم تعيينه عن طريق المقابلات المباشرة مع أولياء أمور المرضى، أعقبه فحص سريري للسبب الرئيسي الداعي للزيارة وخلاله تم تصنيف معدل فقلم الطفل عن طريق (مقياس تصنيف فرانكل للسلوك FBRS). كما كانت صور الأشعة تؤخذ كلما دعت الحاجة عند تشخيص الشكوى الرئيسية وتحديد نوعية العلاج بموجبها.

تم تصنيف مختلف الشكاوي الرئيسي إلى المجموعات الآتية: التوجيه والوقاية، تسوس الأسنان، ترسبات الأسنان وراحلة الفم الكريهة، إصابة الفم والأسنان، ألم، حساسية
الأسنان، سوء الإبطاق، زيادة /نقصان سن، أمراض اللثة والأنسجة المحيطة، تورم، تغيير في لون الأسنان، أخرى.

لتوضيح مدى تطور شكوك تسوس الأسنان تم دمجه مع مقياس أخرى (ألم أو تورم) كالآتي: (تسبس من دون ألم أو تورم، تسوس مع وجود ألم فقط، تسوس مع وجود تورم فقط، تسوس مع وجود ألم وتورم).

النتائج: وجد أن عمر الأطفال الوسيط هو 7.08 سنة، كما خلصت الدراسة إلى أن أغلبية الشكوى الرئيسية في هذه الزيارة كانت تسبس الأسنان بنسبة (74.42%) حيث كان التسوس مع الألم يمثل غالبية الشكوى بنسبة بلغت (44.65%).

أغلب الأطفال أدرجوا ضمن تصنيف فرانكل للسلوك رقم 3 (الإيجابي) وذلك أثناء الفحص السريري وبنسبة بلغت (57.21%). كما وجد أن خلع الأسنان هو العلاج الأساسي الذي إحتاج إليه الأطفال في زيارةهم الأولى لعيدة أسنان الأطفال وبنسبة بلغت (46.98%).

الخلاصة: استنquisarت الدراسة أن الأطفال السودانيين يحضرون إلى عيادة طب أسنان الأطفال متاخر جداً، حيث كانت الشكوى الأساسية لهم هي تسوس وألم الأسنان الذي أوجب علاج فعلي للأطفال (غالباً خلع الأسنان). معظم الأطفال أدرجوا في تصنيف فرانكل (الثالث) للسلوك (إيجابي) خلال الكشف السريري للشكوى الرئيسية.
List of figures:
Figure 1.1: Determinants of child wellness ..........................12
Figure 3.1. A: Percentages of the interviewees of the children at his first dental visit .................................................................45
Figure 3.1.B: Percentages of other interviewees of the children at their first dental visit .................................................................45
Figure 3.2: Knowledge of the interviewee about the ideal age of the first dental visit .................................................................49
Figure 3.3: Anxiety level as rated by FBRS ..............................52
Figure 3.4.A: Percentages of different types of the treatment needed of children brought to pediatric dental clinics for their first dental visit .................................................................54
Figure 3.4.B: Specific other treatment needed at the first dental visit .........................................................................................54
List of tables

Table 3.1: Parents’ educational level presented as frequency (percentages) .................................................................46
Table 3.2: Age groups of children at first dental visit vs tooth type ..............................................................................47
Table 3.3: Correlation between mothers’ education and their children’s age at the first dental visit ........................................48
Table 3.4: Reasons for attendance at the first dental visit to pediatric dental clinics of KTDH and U of K: ..........................50
Table 3.5: Correlation between the Behavior rating Scale and age groups ......................................................................53
Table 3.6: Correlation between the age groups and the treatment needed at the first dental visit ...................................55
Chapter One
Introduction and Literature Review

1.1 Introduction

Infant oral health is the foundation upon which preventive education and dental care must be built to enhance the opportunity for life time free of preventable oral diseases\(^1\).

Over the past several years, much discussion has centered on the age at which a child without identified dental problems should first visit a dentist \(^2, 3\). Several dental professional organizations have offered a strong rationale for making that first visit by age 1 year \(^2\). A visit by age one may provide the opportunity to evaluate craniofacial and dental development, assess risk for common dental conditions, and counsel parents and caregivers on primary prevention interventions before disease progresses, poor habits become well established, or irreversible harm occurs \(^3, 4\). Preventive goals include improvement of the child’s oral hygiene, correction of improper dietary and eating habits, improved knowledge of the role of non-nutritive sucking for the development of malocclusions, improved knowledge of the risks for traumatic injuries, including where, when and how to seek emergency care \(^5\).
The basic of practicing pediatric dentistry is the ability to deal with young children and to guide them through their dental experiences, and here comes the crucial role of the first dental visit as a foundation on which the anxiety level on subsequent dental visits is built. The dentist treating a child patient almost always assesses one aspect of behavior - cooperativeness. Cooperative behavior is the key to render treatment possible.

In pediatric dentistry, one of the most important skills for the dentist is to evaluate children’s behavior [6].

There are many behavior-rating scales available to assess and evaluate the behavior of a child on each dental visit.

The child's behavior on every dental visit depends on many variables such as the age of the child, the behavior of and the psychological status of his/her mother or the accompanying parent (i.e. maternal/paternal anxiety), if the child has a negative past medical experience (i.e. medical history), the child past dental experience (dental history), the awareness of the child of his/her dental problem, the type of the planned dental procedure, the behavior management approach and procedural techniques followed by the treating dentist [7, 8].
For the evaluation of child behavior, the praxiological observation (Praxeology is the science of human action) and recording behavior have been used. Frankl et al. classified child behavior into four groups according to the child’s attitude and cooperation or lack of cooperation during dental treatment \(^9\). It consists of four ratings from definitely negative to definitely positive as follows; score 1 (refusal/distress), score 2 (uncooperative/reluctant), score 3 (cooperative/reserved), score 4 (interested/enjoyed).
1.2 Literature review

1.2.1 Importance of the first dental visit

The first dental visit is an important milestone in the child's life and a timely visit should be an essential part of the child's general health care \[^{10}\].

A change in perspective, from seeing only the curative aspect of dental care to appreciating its preventive and educational value, will improve the compliance of parents with dental health programs and will in turn improve the oral health status of the child. Moreover, the child is exposed to the environment of the dental clinic at an early age and this will help the child to adapt to, and cooperate with, dental treatment in the future \[^{10}\].

Preventive goals include improvement of the child’s oral hygiene, correction of improper dietary and eating habits, improved knowledge of the role of non-nutritive sucking for the development of malocclusions, improved knowledge of the risks for traumatic injuries, including where, when and how to seek emergency care \[^{5}\].
1.2.2 Ideal age at the first dental visit

1.2.2.1 Recommendations:

The age of the first dental visit of the child helps in determining the quality of the preventive dental care that the child will receive and, thus, the future oral health of the child \[^{10}\].

In order to attain the behavioral and preventive goals, it is advantageous if the child’s first dental visit takes place before any acute treatment need has to be addressed \[^{5}\].

The American Academy of Pediatric Dentistry (Adopted 1986 & revised 1989,1994,2001,2004 & 2009) \[^{1}\], the American Dental Association \[^{2}\] and the Bright Futures Project of the National Center for Education in Maternal and Child Health \[^{11}\] recommend that dentists examine toddlers by their first birthday, and that a child should visit the dentist "within six months of the eruption of the first primary tooth and no later than 12 months of age".

The American Academy of Pediatrics (AAP) previously recommended first dental visit at age 3 and recently adopted a policy statement that advocates an oral health assessment of infants by a pediatrician or other qualified pediatric health care professional by 6 months of age \[^{3,12}\].
In the United Kingdom, as conclusion of seminars (a UK viewpoint. International Journal of Paediatric Dentistry / the British Paedodontic Society [and] the International Association of Dentistry for Children) in 2003, it was suggested that parents register their children with a dentist once their first tooth erupts at about 6 months. This is a sound advice but will only be followed if the mother is herself a regular dental attendee and practicing dentists are willing and able to provide this service\textsuperscript{13}.

An Argentinean point of view reported by Furze and Basso (2003) recommends that the timing of the first dental visit to be around the fourth month of intrauterine life\textsuperscript{11}. According to the authors, pre-birth parental counseling visit of the expectant mother where she, personally, receives dental information and assistance, and where both parents are provided with oral health education is a good chance to achieve positive, conscious and responsible parental attitudes and behaviors. In other words, during this pre-birth visit, the dentist has an opportunity to explain to the expectant mother the importance of the dental visit at 6 months of age, educate the mother on eruption of teeth, the preventive measures to be used for infants, and to provide parental counseling
on oral health as general. Particular emphasis can be placed on determining cariogenic risk factors and instituting the use of cariostatic agents such as fluorides\[14\].

The Australian Academy of Pediatric Dentistry meeting in Brisbane, Australia (2002), approved the first edition of its "Standards of Care". The guidelines that the Academy has promulgated for the initial oral examination state that the first oral examination should follow the eruption of the first primary teeth and be no later than 12 months of age. According to these guidelines, the parents/caregivers should receive -in the first 12 months of life- counseling on appropriate oral hygiene procedures, fluoride supplementation, feeding practice and general dietary counseling related to oral health, in addition to counseling for general injury prevention for orofacial trauma and oral habits\[15\].

1.2.2.2 Studies:

In USA, 2009, a study was conducted to determine the first dental visit for children living in a socio economically deprived area in Connecticut. The sample size was collected prospectively on the period between January to December 2004. The mean age for the first visit was 4 years\[16\].
In 2008, a Brazilian study was conducted to assess the use of dental services and age at first dental visit in preschool children in Canela, Rio Grande do Sul State, Brazil. A representative sample of 192 under-five children was surveyed on National Children's Vaccination Day, 13.3% of the sample had already visited the dentist at least once, but only 4.3% had their first dental visit by one year of age. The number of children who had already visited a dentist increased with age\textsuperscript{[17]}.

A cohort study in the United States done by Nainar and Straffon in 2002 showed that the first dental visit should be performed at 1 year of age for all children from a low socioeconomic background. However, it can be an elective visit for infants from middle- to high socioeconomic status families. In this study 340 parents completed all eleven questionnaires during the 36-months study period. The results showed that only 32% of children aged 2-4 years had a dental visit in the past 12 months \textsuperscript{[18]}. Slayton et al. in their Iowa Fluoride Study, in 2005, with a sample size of 588, reported that among children between birth to 3 years, only 2% of the parents reported that their child had a dental visit by 1 year of age \textsuperscript{[19, 20]}. 
In 2001 Gomez et al. conducted a study in the form of a mother-and-child preventive dental program in Chile that included women from their fourth month of pregnancy as well as lactating mothers with their infants. In this study, the dental health of the 180 infants who participated in the program was followed until age 4 years and compared with 180 controls who did not participate in the program. The authors concluded that "a long-term preventive program for mothers and children starting during pregnancy and continued until the child was 4 years old, resulted in reduced streptococcus mutans colonization, and therefore, reduced caries incidence in children, with a significant improvement in oral health of their mothers" [20].

In 1997, a survey was done in Adelaide, South Australia about the age at first dental visit, where a weighted random sample of 160 parents of 2±3-year-old children was targeted. The sampling strategy that was used ensured that a random sample was selected that had a representation across the age range from 2 years to 3 years 11 months, and participation of children from a wide range of ethnic and socioeconomic groups. The results showed that only
9.1% of the children had their first dental visit at the age range of 5-12 months, whereas 74.4% had not visited the dentist yet \textsuperscript{[21]}.  

Another study was done in Saudi Arabia in 1995 about the Use of sweet snacks, soft drinks and fruit juices, tooth brushing and first dental visit in high DMFT 4-6 year olds of Riyadh region, first dental visit of the children was obtained through a self-administered questionnaire completed by the parents of the 68 selected children, the mean age of first dental visit among the study children was 63 (S.D 16.9) months \textsuperscript{[22]}.  

In 1991, a longitudinal Scandinavian study was carried out in Sweden with a sample size of 632 to identify carious lesions in children aged one and two years. The results have shown that the prevalence of caries (initial lesions included) at the age of one year was close to zero, but increased to 8% at the age of two \textsuperscript{[23]}. The fast progression of initial lesions diagnosed at the age of 2.5 years \textsuperscript{[23][5]} indicates the need for early intervention aimed at arresting the initial lesions. Based on these data, the child’s first visit is often recommended to take place around the age of one \textsuperscript{[23]}.  

1.2.3 Factors influencing early dental care

In 2000, the Institute of Medicine and the National Research Council (Washington), commissioned From Neurons to Neighborhoods: the Science of Early Childhood Development \(^{24, 25}\) to review the last three decades of research in child development, including the neurobiological, genetic, social, and behavioral sciences \(^{25}\). Authors of this report concluded that children’s health and other psychosocial outcomes are inextricably linked to their early social and physical environments. Levels of influence move from the child to family/caretakers, school/peers, community, and society \(^{25}\) (Figure 1.1).

Oral health problems are not self-limiting; rather, they progress if left untreated. The relationship between needs and utilization in oral health is complicated by this progression. One conceptualization of this relationship is a spiral in which delayed care or the lack of care creates more severe health care needs, which, in turn, result in increased barriers to care. Delay in dental treatment creates barriers because the dental problems become more complicated and more expensive to treat \(^{26}\).
From several studies, it is evident that the factors influencing early dental care are socioeconomic status \[^{28}\], awareness and knowledge regarding infant oral health among general dentists and pediatricians \[^{29}\], health insurance coverage \[^{14, 30}\] and parents' attitude towards early dental care \[^{30}\].

It has already been demonstrated that a social gradient exists in \[^{31}\] children’s oral health status and dental care utilization. For example, children who are in a racial/ethnic minority or living
in poverty are less likely to visit the dentist than their more advantaged counterparts \cite{26, 32, 33}.

Children of low income families tend to receive episodic or emergency dental care, while those from higher-income households visit dentists more often for preventive checkups.

Parents are decision-makers in matters of children health and healthcare, thus they play an important role in achieving the best oral health outcomes for their young children \cite{34}.

Parents are unlikely to solicit dental care of their own accord to their children without education, motivation and help from physicians who see children at least 11 times for well child visits through age three \cite{34, 35}.

In Detroit, 2007, a study was done to investigate the determinants of dental care visits among young, low-income African-American children. 552 children aged 3 to 5 years (and their primary caregivers) were the focus of this analysis. Results showed that Children with private dental insurance had four times higher odds of having visited a dentist compared with those who had no dental insurance. A child’s age and a caregiver’s educational attainment were positive and significant determinants of child
dental visits. Caregivers who visited a dentist for preventive reasons were five times more likely to have taken their children to visit the dentist [36].

In 2003, a study was done to investigate the effect of different socio-demographic factors of Saudi parents on their knowledge and attitudes toward their children's first dental visit. A self-administered questionnaire was distributed to 909 Saudi parents attending the dental clinic of the College of Dentistry at King Saud University, Riyadh. Based on the results, it can be concluded that Saudi parents lack sufficient knowledge about the timing of the first dental visit and the importance of behavior modification for their children [37].

In 2002, another study was performed to evaluate parents' awareness about the timing of their children first dental visit and to determine the main reasons for bringing the child to the dentist in the first visit. The results of the study -which was conducted among Saudi parents attending the dental school at the College of Dentistry, King Saud University, Riyadh, Kingdom of Saudi Arabia-revealed that Some parents reported that their child's first dental visit should be in the 3rd year (42%) while others thought it
should be in the 6th year (34.4%). Also Regular visit (40.3%) and emergencies (28.1%) were the main reasons to bring the children to the dentist [38].

Clamencia M. and Cynthia R. in 2002, studied the relationship between children’s dental need and dental care utilization in the United States, using data from the third National Health and Nutrition Examination Survey (NHANES III). It was conducted between 1988 and 1994. Results revealed that higher percentage of non-Hispanic White children and children from higher-education households reported having had a visit in the previous year and having regular dental visits, while non-Hispanic Black and Mexican American children and those from low-education households were more likely to report visiting the dentist as needed or never having had a dental visit [26]. The same study also sub grouped children according to their age into 2 age groups, 2 to 5 years and 6 to 18 years. Results showed that perceived needs were reported for substantially fewer children in the younger age category (9.4%, SE = 0.79) than in the 6- to 18-year-old group (21.1%, SE = 1.29) [26].
1.2.4 Organization of the child’s first dental visit

Physicians are the first health professionals to come in contact with the expectant parents and parents of infants \(^{34, 39}\). Hence, integrating oral health disease prevention and promotion strategies into these healthcare professionals practice would improve access to dental care, especially for the poor and minority children who suffer disproportionately from dental caries and have limited access to dental care \(^{34, 40}\).

Anticipatory guidance is the process of providing practical, developmentally appropriate information about children’s health to prepare parents for significant physical, emotional, and psychologic milestones \(^{41}\). It is well accepted among physicians that using anticipatory guidance during well-child medical visits is an effective tool for educating parents about how to ensure the best possible health for growing children. Recently the American Academy of Pediatrics adopted new recommendations regarding the inclusion of oral health in anticipatory guidance during well-child visits \(^{7}\).

There seems to be a growing consensus that pediatricians should take an active role in promoting children's oral health. At
present, however, it is unclear how frequently pediatricians screen for common oral conditions such as dental caries, which methods they use to conduct screenings, how they document findings, and how accurate such screenings are\cite{3, 42}.

One way of organizing the child’s first dental visit is to coordinate it with and incorporate it into the visits to the maternal and child health (MCH) clinics, as previously carried out in Scandinavian countries e.g. Norway and Sweden\cite{5, 43}.

The child’s first dental visit at the dental clinic is sometimes organized as a ‘play-meeting’, where groups of mothers with their children attend a session. The advantage of this approach is the psychological support mothers and their young children can give each other\cite{5}.

Strong clinical evidence exists for the efficacy of early professional dental care complemented with caries-risk assessment, anticipatory guidance, and periodic supervision. The establishment of a dental home may follow the medical home model as a cost effective and higher quality health care alternative to emergency care situations\cite{44}.
1.2.5 The Dental Home

The American Academy of Pediatric Dentistry (AAPD) supports the concept of a “dental home” for all infants, children, adolescents, and persons with special health care needs. The dental home is inclusive of all aspects of oral health that result from the interaction of the patient, parents, non dental professionals, and dental professionals. Establishment of the dental home is initiated by the identification and interaction of these individuals, resulting in a heightened awareness of all issues impacting the patient’s oral health. This concept is derived from the American Academy of Pediatrics’ (AAP) definition of a “medical home” which states pediatric primary health care is best delivered where comprehensive, continuously accessible, family-centered, coordinated, compassionate, and culturally effective care is available and delivered or supervised by qualified child health specialists.[44]

The AAP (American Academy for Pediatrics) issued a policy statement defining the medical home in 1992.[44, 45] Since that time, it has been shown that health care provided to patients in a medical
home environment is more effective and less costly in comparison to emergency care facilities or hospitals \[44-46\].

The council on clinical affairs define the dental home as the ongoing relationship between the dentist and the patient, inclusive of all aspects of oral health care delivered in a comprehensive, continuously accessible, coordinated and family centered way. Establishment of dental home begins no later than 12 months of age and includes referral to dental specialists where appropriate \[47\] (adopted 2006 and reaffirmed 2010).

The concept of a dental home for children is new to most of the dental profession. For medical practitioners, however, the concept of identifying a child with a practitioner in a familiar and safe health supervision relationship is well-established \[48, 49\].

Although a dental home most often connotes a building, place or clinic, it also has to be a philosophy embraced by the dental practice. A practice that embraces children early and continues to follow them periodically through life would be the ideal. The dental home may begin in the office of a pediatric dentist and then move to that of a family practitioner, once the child has matured and is more comfortable being treated by the parents’ dentist \[49\].
An important feature of a dental home is to provide anticipatory guidance to the parents so that they are aware of their children’s growth and development, as well as possible risk factors that occur as children age. Anticipatory guidance provides a framework for practitioners and their staff members to periodically engage parents in conversations about the anticipated needs of the children \cite{49}.

Another feature of the dental home would be coordination of specialized care for the child. When a child has been observed over a period, appropriate recommendations can be made for other treatments such as orthodontic referral and observation. Using age-related guidelines and recommendations from the orthodontic community, appropriate scheduling of referrals can be made to optimize treatment and eliminate numerous referrals before treatment is initiated \cite{49}.

Behavioral research supports a child’s increased levels of comfort and reduced anxiety levels as familiarity increases with the dental environment \cite{49, 50}. Being greeted cheerfully by the receptionist and staff in a non-threatening, child-friendly environment reduces anxiety and improves behavior \cite{49}.
1.2.6 Reasons for seeking dental care at the first dental visit

A retrospective study by Meera et al., 2007, carried out using the case records of 716 children who reported to the postgraduate section of the Pediatric dental clinic in Chennai (India), the maximum number of children who reported for their first dental visit was between 6-12 years (59.08%). Most common chief complaint for the visit was pain (42.04%). Second common complaint being dental caries (28.49%) [10].

In a prospective study done in India, 2007, the maximum number of children who reported for their first dental visit was between 6-12 years (69.77%). Most common chief complaint was dental caries (34.88%). Second common complaint being pain (27.91%) [10].

1.2.6.1 Early Childhood Caries (ECC)

Early childhood caries (ECC) is defined as dental decay among children below 5 years of age [51].

Early childhood caries (ECC) is the most common dental problem encountered in children. At this early dental visit, white spot lesions can be detected and parents can be trained to perform
active preventive measures which can help avoid severe lesions later in life \[10\].

ECC has far-reaching effects beyond the consequences of decayed teeth. Children with ECC are significantly more likely to weigh less than 80% of their ideal body weight and to experience failure to thrive \[52\].

Several demographic factors have been consistently shown to be related to the occurrence of caries. These factors are associated with either the person or the environment in which the person has lived \[53\].

In a comprehensive cross-sectional study in Khartoum, Sudan (1993), the oral health and dietary habits of 4-5 and 7-8-years-old Sudanese children were correlated to the dental behavior of the parents. The authors reported that the dmft among these 2 age groups of Sudanese children living in Khartoum to be 1.68 and 2.77 respectively. Fifty-eight percent of 4-5-years old were caries free compared to only 33% in the 7-8-years-old group. The DMFT, in the 7-8 year group was 0.15 only. In this study, caries prevalence, although still low, increased with age. When the children were grouped according to their soci-economic status, there was no
statistically significant differences in caries prevalence between the groups \[54\].

In 1992, a cross sectional study among Sudanese children reported the distribution of caries-free children for 3, 4 and 5 years-old to be 49%, 45% and 38% for respectively. In this study caries prevalence also increased with age, and the difference between the three age groups was also statistically not significant \[55\].

### 1.2.7 Variables influencing children’s dental behaviors

The various schools of psychologic thought agree that anxiety is a personality trait, but they have various opinions concerning the origin of this trait. By the same token, dentistry has had some difficulty identifying the stimuli that lead to misbehavior in the dental office, although several variables in children's backgrounds have been related to it \[56\].

In 1981, a study was conducted in Laval University, Quebec, Canada, to verify the relative efficacy of two forms of pre-exposure which are identical in content and parallel in mode of exposure (in vivo or videotape). These two forms of pre-exposure were given to 38 children, aged four to six years old, before their
first dental visit. The results showed that all groups manifested relatively little negative behavior while seeing the dentist\textsuperscript{57}.

1.2.7.1 Maternal anxiety

In past years, it has been customary for mothers, more often than fathers, to accompany children to the dental office. For this reason, the effect of maternal anxiety on children's dental visits has received considerable attention in the dental literature\textsuperscript{56}.

In 2002, a study was done to determine the relationship between children's first dental visit and their dental anxiety in the Veneto Region of Italy. Parents of 378 children filled out a questionnaire. Factors related to child dental anxiety were explored. Parental anxiety was associated with child's anxiety (OR = 2.3, 95\% CI = 1.1-4.9) and a problematic first visit was a strong predictor of dental anxiety\textsuperscript{58}.

Another study was done in 2002, to assess the influence of pre-existing dental anxiety and maternal anxiety on the behavior of some Nigerian children during dental appointments. Two hundred and sixty children aged 2-15 years participated in this study. They were treated at the three government dental establishments in Ibadan, a city in South Western Nigeria, over a six-month period.
The children's behavior during different stages of treatment was determined by the Frankl's Behavior Rating Scale. The outcome of the study showed a general tendency towards cooperative behavior among patients whose mothers had low anxiety levels. This study shows the importance of correct assessment of the pre-operative dental anxiety status in children as well as the level of anxiety in their mothers \cite{59}.

In a study conducted by Ronald Johnson et al., (1968), a significant relationship was observed between the behavior of 60 children (3 to 7 years old) undergoing a dental extraction and the anxiety level of their mothers as measured by scores on the Taylor manifest anxiety scale. The results of this investigation indicated that, in this sample, maternal anxiety appears to be a major factor affecting the behavior of young children experiencing dental extraction \cite{60}.

1.2.7.2 Medical History

There is general agreement, however, that children who view medical experiences positively are more likely to be cooperative with the dentist. The emotional quality of past visits rather than the number of visits is significant \cite{56}.
Pain experienced during previous medical visits is another consideration in a child's medical history. The pain may have been moderate or intense, real or imaginary. Nonetheless, parental beliefs about past medical pain also are significantly correlated with their children's cooperative behavior in the dental environment. There is evidence that previous surgical experiences adversely influence behavior at the first dental visit, however this was not the case in subsequent visits[56].

1.2.7.3 Awareness of the dental problem

There is a tendency toward negative behavior at the first dental visit when the child believes that a dental problem exists. Such behavior may be the result of apprehension transmitted to the child by a parent [56].

1.2.8 Dental anxiety scales used in children

Many studies have investigated the emotional stress including fear and anxiety, of children undergoing dental treatment. These studies have been classified mainly into three groups: psychological evaluation [61, 62], behavioral evaluation [61, 63, 64] and physiological evaluation [61, 62, 65-67]. Of these approaches, behavioral evaluation may be the most practical for clinical use since the psychological
evaluation of children is difficult, and special devices such as pulse oximetry are required for physiological evaluation. In terms of behavioral evaluation, various scales have been developed, such as the Frankl Behavior Rating Scale [9, 61], the behavior evaluation score developed by Kurusu [61], the simple and complex scale [61, 68], and scales proposed by Leventhal [61, 69], and Weinstein [61, 70]; however, none of these scales are used in the daily clinical practice of pediatric dentistry [61].

Early exposure to and familiarization of the child with the dental environment are seen as important measures in reducing dental anxiety in young children.

The child’s first dental visit is also an important occasion for the parent to address his or her own anxiety and fear of dental care, which in turn may reflect on the child. Clarification of the parents’ role in supporting the child emotionally before, during and after future dental visits is another important goal [5].

Despite the number of measures reviewed and their widespread use in dental research, many issues in regard to measuring anxiety remain unresolved. Lindsay and Jackson [71] argued that existing measures of fear of dentistry fail to encompass
new knowledge of the factors that contribute to dental anxiety, particularly the role of negative thoughts—such as focusing on catastrophic outcomes—in the maintenance of dental fear. The measures surveyed are based, for the most part, on the physiological manifestations of anxiety, with relatively little emphasis placed on behavioral and cognitive responses [72].

In India (2009), Case records of 247 children (144 boys and 103 girls) who had had a minimum of three visits to the Department of Pedodontics, Meenakshi Ammal Dental College, Chennai, India, were used to carry out a retrospective study. All the children were examined and treated by the same pediatric dentist. Wright's modification of Frank's behavior rating scale was used to assess the behavior of all the children in each of their visits to the dental office. On the first dental visit, 10 children exhibited Frankl 1 (Wright's --) behavior. Twenty-three children showed Frankl 2 (Wright's -) behavior. Frankl 3 (Wright's +) was exhibited by 161 children. Fifty-three children showed Frankl 4 (Wright's ++) behavior. Statistically significant differences in Frankl 1 (--) and Frankl 2 (-) categories, between different age groups, were seen (p-value 0.003 and 0.02, respectively). No statistically significant
differences between the male and female groups were seen in any of the age groups \([8]\).

In Japan, 2005, patients were 33 (14 male and 19 female) children making their first visit to a dentist at the department of pediatric dentistry in Tsurumi University of Dental Hospital. The age range was 3-9 years (mean age, was 4 years and 8 month). Classification of child behavior based on frankl behavior rating scale was as follows: 22 patients (66.7\%) were classified as level 3. 5 patients (15.2\%) were classified as level 1 and 2. And 1 (3.1\%) patient was classified as level 4 \([61]\).

Colares et al., in 2002, studied the factors associated with uncooperative behavior by Brazilian preschool children in the dental office, the sample consisted of 177 Brazilian children of both sexes, ages from three to six years. The children were observed during their dental appointments and their behavior was categorized by the Frankl Behavioral Rating Scale, Of the children, 1\% presented definitely positive behavior, 59\% positive behavior, 28\% negative behavior, and 12\% definitely negative. A significant association was found between children with negative behavior and the variables of the child's age, parent's or guardian's education,
learning or behavioral problems, parent's or guardian's anxiety, child oral health status, general health problems, history of hospitalization, and dental history \[61, 64\].

Tanabe et al., in 2002, studied the relationship between dental fear and experience of dental injection in cooperative and uncooperative Japanese child patient. He reported that level 3 was the most frequent classification, followed by level 4, 1 and 2 in children aged 5-12 years \[61, 64, 73\].

In 1995, a study was done in Spain to determine the relationship between the anxiety level at the first dental visit and the personality and intelligence of a child. Forty children (20 boys and 20 girls) aged 8-16 years with no previous experience of dental visits were included in the study. Results showed that there was no significant relationship between levels of dental anxiety and age \[74\].
1.3 Justification of the study

This study is conducted in order to obtain baseline data about the average age at which Sudanese parents first seek dental care for their children, and to find out the common reasons for attendance and the type of treatment needed accordingly.

Also to report on the anxiety level of Sudanese children at this visit using an appropriate behavior-rating scale, Frankl Behavior Rating Score (FBRS).

Specific preventive programs can also be designed to tackle dental problems of these "inexperienced" dental patients as early as possible.
1.4 Objectives of the Study

1.4.1 General objectives

The general objectives of this study are to assess the determinants of the first dental visit in terms of age, chief complaint(s), treatment needed and anxiety level in a group of Sudanese children attending Pediatric Dental Clinics at Khartoum Teaching Dental Hospital (KTDH) & University of Khartoum (U of K).

1.4.2 Specific objectives

1. To correlate the mother’s education with the age of their children’s first dental visit.

2. To evaluate the companion’s (or caregiver’s) knowledge about the ideal age of the first dental visit.

3. To compare children’s anxiety level at this visit with their age.

4. To correlate the age of the child at the first dental visit with his/her treatment needed.
Chapter two

Material and methods

2.1 Study design:

The study is a descriptive, cross-sectional, dental hospital-based study.

2.2 Study area:

The study was conducted in the Pediatric Dental Clinics at Khartoum Dental Teaching Hospital (KTDH) and Faculty of Dentistry, University of Khartoum (U of K). These are the two major public pediatric dental clinics in Khartoum city.

2.3 Sampling:

2.3.1 The sample

A sample size of 215 children was targeted. This sample was calculated for level of significance of 0.05 and power equal 0.90 using equation provided for sample size with one proportion in Basic and Clinical biostatistics\(^{[75]}\). as follows:

\[
n = \left( \frac{Z_\alpha \sqrt{\pi_0(1-\pi_0) - Z_\beta \sqrt{\pi_1(1-\pi_1)}}}{\pi_0 - \pi_1} \right)^2
\]
where n = the sample size

\( \alpha \) = Level of significance.

\( \beta \) = Power of the test associated with alternative hypothesis.

\( \pi_0 \) = Null Hypothesis (the age at which Sudanese children are brought to pediatric dental clinics for the first time is the same as the international recommendation).

\( \pi_1 \) = Alternative Hypothesis (the age at which Sudanese children are brought to pediatric dental clinics for the first time is more than the international recommendation).

\( Z_\alpha \) = the two-tailed z value related to the null hypothesis.

\( Z_\beta \) = the lower one-tailed z value related to the alternative hypothesis.

2.3.2 Inclusion criteria

All Sudanese children (their nationality determine by their father’s nationality) attending pediatric dental clinics of Khartoum Dental Teaching Hospital (KTDH) and Faculty of Dentistry, University of Khartoum (U of K), in the period from end of February to mid of May 2010, for their first dental visit who were accompanied by their parents (or caregivers).
2.3.3 Exclusion criteria

The following groups were excluded from the sample:

1. Children with special needs i.e. mentally and/or physically handicapped.

2. Children with medical problems or taking a regular medications. (The two previous groups may have some conditions which may affect their anxiety level in the dental clinic and therefore, should be studied as separate entities).

3. A child whose parent refuses to participate in the study.

2.4 Instruments:

- Examination set including: plane dental mirrors, new ball-tip (blunt) explorers, spoon excavators and tweezers.

- Disposable examination gloves.

- Disposable masks.

- Sterile cotton rolls.
2.5 Methods of Data Collection

2.5.1 Ethical approvals and Parents consents

Written approvals of the University of Khartoum research committee and Khartoum Dental Teaching Hospital authorities were obtained (appendix II). Verbal approval of children’s parents (or caregivers) was also obtained before starting the interview after explaining the aim of the research and the dental examination that would be carried out.

2.5.2 Parent's interview

A written questionnaire was completed by direct interview of the parents/or caregivers. The questionnaire included the following items (appendix I):

- Demographic data of the child i.e. name, age, date of birth, gender, and address.
- The age of the child was determined by the last birthday.
- Educational levels and occupations of both parents.
- The reason(s) for the children's attendance were obtained from either older children or responsible caregiver in younger ones or both. The question asked was: ‘What specifically made you come to our dental clinic today?’
- Chief complaint(s) was divided into the following categories:

1. Orientation and prevention.
2. Dental caries.
3. Deposits / bad breath.
4. Trauma.
5. Pain / sensitivity.
7. Missing / extra tooth.
8. Soft tissue lesions.
10. Discoloration.
11. Other reasons, specify.......... 

When dental caries was the chief complaint, it was further combined with other parameters (pain and/or swelling) to clarify its extent as follows; ‘dental caries alone (without pain or swelling), ‘dental caries with pain’, ‘dental caries with swelling’ and ‘dental caries with pain and swelling’.

- Questions concerning the dental knowledge & attitude of companion or caregiver including:
a) Ideal time for their child’s first dental visit.

b) Importance of preventive dental visits and of primary teeth.

2.5.3 Clinical examination

2.5.3.1 Infection control

Special care was given to infection control measures. Mirrors, probes and tweezers were used once and then sterilized by autoclave. Pair of disposable examination gloves and disposable mask were used for each child.

3.5.3.2 Examination of the chief complaint

Clinical oral examination was performed for the chief complaint(s). Radiographs; periapical views and DPTs, were taken whenever needed to confirm diagnosis of the chief complaint and to determine the treatment needed accordingly.

The treatment needed was broadly classified into:

a) Preventive measures; including dental education, oral hygiene instructions, dietary counseling, fluoride application and fissure sealants.

b) Conservative treatment; including all types of restorations without the need for endodontic treatment.
c) Pulp therapy; including endodontic therapy for primary, immature and mature permanent teeth.

d) Extraction; whenever the tooth is considered unrestorable and contradict the implementation of endodontic treatment.

e) Others; include any other treatment not mentioned above and referrals to other departments.

When dental caries was the chief complaint, the treatment needed was assessed after careful history of the present complaint and clinical examination with or without radiographic recording (periapical views and DPTs).

The clinical and/or radiographic caries diagnosis upon which specific treatment needed was categorised followed the criteria for graded severity registration of caries on different surfaces[^76]:

1. For smooth surface caries (buccal and lingual):
   1. White or discolored enamel with no cavitation clinically, the treatment needed was categorized as preventive measures.
   2. Small cavitation in enamel without dentin involvement.
   3. Moderate sized cavity in enamel with exposed dentin (verified by gentle probing).
   4. Large cavity in enamel and moderate cavity in dentin.
the treatment needed in (2,3&4) was categorized as conservative treatment.

5. Extensive cavity in enamel and substantial loss of dentin with or without dilation of the lamina dura or periapical radiolucency or very large cavity with clinical pulp exposure and/or dilatation of the lamina dura or frank periapical radiolucency, the treatment needed was categorized as endodontic treatment.

6. Unrestorable crowns or remaining roots, the treatment needed was categorized as extraction.

II. For occlusal caries:

1. White or brown discoloration in enamel. No clinical cavitation or radiographic evidence of caries, the treatment needed was categorized as preventive measures.

2. Small cavity formation or discoloration of the fissure with surrounding gray/opaque enamel and moderate or big cavitation with or without radiolucency in the outer or middle third of dentin, the treatment needed was categorized as conservative treatment.

3. Very large cavity and radiolucency in dentin in close proximity to the pulp, in case of permanent teeth the treatment was
categorized as conservative treatment, while in primary teeth it was categorized as endodontic.

4. Unrestorable crown or remaining root, treatment needed was categorized as extraction.

III. For approximal caries:

Only clinically detectable caries that caught the probe or has led to a break in the marginal ridge has been recorded as follows:

1. Small cavity with or without loss of less than one third of the marginal ridge without widening of the lamina dura, treatment needed was categorized as conservative treatment.

2. If large cavity with loss of more than one third of the marginal ridge with or without dilatation of the lamina dura or frank periapical radiolucency, treatment needed was categorized as endodontic treatment.

3. If very large cavity with unrestorable crown, treatment needed was categorized as extraction.

After completion of data collection, all interviewed mothers/caregivers received dental information and dietary counselling as appropriate. In addition, all examined children received dental preventive measures, as well as the required
treatment and/or appropriate referral for any comprehensive dental treatment.

2.6 Clinical Behavior assessment:

FBRS was used to evaluate children’s cooperativeness during examination of their chief complaint. All examinations and ratings were done by the same investigator.

The criteria of this scale are as follows:

**Rating1**: Refusal of treatment, crying forcefully, fearful, or any other evidence of negativism.

**Rating2**: Reluctant to accept treatment, uncooperativeness, some evidence of negative attitude but not pronounced.

**Rating3**: Acceptance of treatment, at time cautious, willingness to comply with the dentist, at time with reservation but patient follows the dentist’s directions cooperatively.

**Rating4**: Good rapport with the dentist, interested in dental procedures, laughing and enjoying the situation.

2.7 Data analysis:

Two levels of data analysis were performed, descriptive and inferential. In the descriptive level, the data were summarized using standard statistical numerical and graphical summary tools. Then
the inferential statistical techniques were used to test the relevant hypothesis and to construct confidence interval for the parameters under study. Amongst inferential techniques used, and since the age was not normally distributed, the Sign Rank test (nonparametric technique) was used to check if the age at the first dental visit complies with the international recommendations (1 year of age). The variable age was grouped into four major groups to facilitate its correlation with other variables under the study. The age groups were as follows:

- Group I (0-3 years).
- Group II (> 3-6 years).
- Group III (> 6-9 years).
- Group IV (> 9-16 years).

For the analysis of the chief complaint(s) and the anxiety level, descriptive methods using proportions and graphs were used. Stata (version 13) was used to facilitate the data analysis.
Chapter three

Results

3.1 General Characteristics of the Sample

From the 215 child attending the pediatric dental clinics for the first time, 180 (83.72%) children were brought to Khartoum Teaching Dental Hospital (KTDH) and only 35 (16.28%) children were brought to Faculty of Dentistry U of K.

The sample was almost equally divided between sexes, 119 (55.4%) were males while 96 (44.7%) were females.

Children were mostly accompanied by their parents; mothers constituting (61.4%) and fathers (31.2%) (Figure 3.1.A &B).

Most of the attendees to both pediatric dental clinics were from Khartoum province (86.0%).

Regarding the educational levels of the parents, almost two thirds of the subjects' parents had only primary or secondary school, 61.86% of the mothers and 64.65% of the fathers (Table 3.1).
Figure 3.1.A  Percentages of the interviewees at the first dental visit

![Pie chart showing percentages of interviewees at the first dental visit.]

Figure 3.1.B  Percentages of other interviewees at the first dental visit

![Pie chart showing percentages of other interviewees at the first dental visit.]
3.2 Age of the children at the first dental visit

The median age of Sudanese children attending pediatric dental clinics of KTDH and Faculty of dentistry U of K for their first time was 7.08 years.

Table 3.1 Parents’ educational level presented as frequency (percentages)

<table>
<thead>
<tr>
<th>Level of education</th>
<th>Mother</th>
<th>Father</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency (%)</td>
<td>Frequency (%)</td>
</tr>
<tr>
<td>Illiterate</td>
<td>31 (14.42%)</td>
<td>20 (9.3%)</td>
</tr>
<tr>
<td>Primary or secondary education</td>
<td>133 (61.86%)</td>
<td>139 (64.65%)</td>
</tr>
<tr>
<td>High education</td>
<td>44 (20.47%)</td>
<td>53 (23.65%)</td>
</tr>
<tr>
<td>Post graduation studies</td>
<td>7 (3.26%)</td>
<td>3 (1.4%)</td>
</tr>
<tr>
<td>Total</td>
<td>215 (100%)</td>
<td>215 (100%)</td>
</tr>
</tbody>
</table>

The children’s age was divided into 4 groups; group 1 constitute children aged from 0-3 years, group 2 more than 3-6 years, group 3 more than 6-9 years and group 4 more than 9 years. More than 90% of the children were more than 3 years of age. The
least percentage of children (8.37%) belonged to the youngest age group (1-3 years) (Table 3.2).

The age was not normally distributed and so the Sign and Sign Rank tests were used to test the null hypothesis. The null hypothesis was rejected, since the age of Sudanese children reporting to pediatric dental clinics of KTDH and U of K for their first dental visit was greater than the International Recommendations stated by the American Academy of Pediatric Dentistry (AAPD) (p <0.0005).

Table 3.2 Age groups of the children at their first dental visit

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Freq.</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 3</td>
<td>18</td>
<td>8.37</td>
</tr>
<tr>
<td>More than 3 to 6</td>
<td>74</td>
<td>34.42</td>
</tr>
<tr>
<td>More than 6 to 9</td>
<td>76</td>
<td>35.35</td>
</tr>
<tr>
<td>More than 9</td>
<td>47</td>
<td>21.86</td>
</tr>
<tr>
<td>Total</td>
<td>215</td>
<td>100</td>
</tr>
</tbody>
</table>

The educational levels of mothers did not have a significant effect on the age at which they brought their children to the
pediatric dental clinic for the first time (Pearson chi² (9) =3.1014, p= 0.960) (Table 3.3).

**Table 3.3 Correlation between mothers’ education and their children’s age at the first dental visit**

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Mother Education (%)</th>
<th>Illiterate</th>
<th>1ᵗʳ or 2ᵗʳ education</th>
<th>Higher education</th>
<th>Post grad. Studies</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 3</td>
<td></td>
<td>11.11</td>
<td>61.11</td>
<td>27.78</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>&gt;3 to 6</td>
<td></td>
<td>12.16</td>
<td>60.81</td>
<td>22.97</td>
<td>4.05</td>
<td>100</td>
</tr>
<tr>
<td>&gt; 6 to 9</td>
<td></td>
<td>17.11</td>
<td>60.53</td>
<td>18.42</td>
<td>3.95</td>
<td>100</td>
</tr>
<tr>
<td>&gt; 9</td>
<td></td>
<td>14.89</td>
<td>65.96</td>
<td>17.02</td>
<td>2.13</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>14.42</td>
<td>61.86</td>
<td>20.47</td>
<td>3.26</td>
<td>100</td>
</tr>
</tbody>
</table>

P- value =0.96

When the interviewee (mostly the parents (92.2%)), were asked about the ideal age for the first dental visit, almost half of them (49.77%), thought that the child should be brought to the pediatric dentist only if he/she complains of pain in his/ her teeth or gum, regardless of the age (Fig. 3.2).
3.3 Chief Complaint at the first dental visit

The main reason for the subjects attendance of the pediatric dental clinics for the first time was dental caries (74.42 %), of which dental caries and pain constituted the majority (44.65 %) (Table 3.4).
Table 3.4 Reasons for attendance at the first dental visit to pediatric dental clinics of KTDH and U of K.

<table>
<thead>
<tr>
<th>Chief complaint</th>
<th>Frequency</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation + prevention</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Dental caries</td>
<td>53</td>
<td>24.65</td>
</tr>
<tr>
<td>D.C+ pain + swelling</td>
<td>2</td>
<td>0.93</td>
</tr>
<tr>
<td>Dental caries + pain</td>
<td>96</td>
<td>44.65</td>
</tr>
<tr>
<td>Dental caries + swelling</td>
<td>9</td>
<td>4.18</td>
</tr>
<tr>
<td>Deposit/ bad breath</td>
<td>1</td>
<td>0.47</td>
</tr>
<tr>
<td>Trauma</td>
<td>12</td>
<td>5.58</td>
</tr>
<tr>
<td>Pain / sensitivity</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Malocclusion</td>
<td>5</td>
<td>2.32</td>
</tr>
<tr>
<td>Missing/ extra tooth</td>
<td>2</td>
<td>0.93</td>
</tr>
<tr>
<td>Soft tissue lesion</td>
<td>12</td>
<td>5.58</td>
</tr>
<tr>
<td>Swelling</td>
<td>11</td>
<td>5.12</td>
</tr>
<tr>
<td>Discoloration</td>
<td>5</td>
<td>2.32</td>
</tr>
<tr>
<td>Others reasons</td>
<td>7</td>
<td>3.26</td>
</tr>
<tr>
<td>Total</td>
<td>215</td>
<td>100 %</td>
</tr>
</tbody>
</table>
Almost 95% of parents thought that preventive dental visits are important and 72.09% agreed that primary teeth are important for every child.

3.4 Anxiety level at the first dental visit

Classification of children anxiety level during the examination of their chief complaint based on the FBRS, showed that most of children were rated as level 3 (positive) (57.21%), followed by level 2 (negative) (19.53%), then level 1 (definitely negative) (13.49%) and the least is level 4 (definitely positive) (9.77%) (Figure 3.3).

The relationship between the different age groups and the behavior ratings during the first visit dental examination was statistically highly significant (Pearson Chi Squire test) (Pearson chi² (9) = 40.2043, P = 0.000). The younger the child the more uncooperative he is (Table 3.5).
Figure 3.3 Anxiety level as rated by FBRS
Table 3.5 Correlation between the behavior rating scale and age
groups:

<table>
<thead>
<tr>
<th>Age group</th>
<th>Frankl Behavior Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rating 1 (--)</td>
</tr>
<tr>
<td>1—3</td>
<td>38.89%</td>
</tr>
<tr>
<td>&gt;3 to 6</td>
<td>20.27%</td>
</tr>
<tr>
<td>&gt; 6 to 9</td>
<td>7.89%</td>
</tr>
<tr>
<td>&gt;9</td>
<td>2.13%</td>
</tr>
<tr>
<td>Total</td>
<td>13.49%</td>
</tr>
</tbody>
</table>

P- value = 0.000

3.5 Treatment needed at the first dental visit

The study showed that almost half of children (46.98%) who
attended the two pediatric dental clinics for the first time needed
extraction as treatment for their chief complaint, followed by pulp
therapy (37.67%) (Figure 3.4). Most of the other treatment category
included referral to orthodontic and surgical departments (Figure
3.5).
Figure 3.4.A. percentages of different types of the treatment needed of children brought to pediatric dental clinics for their first dental visit

Figure 3.4.B Specific other treatment needed at first dental visit
A significant relationship was shown between the age groups and the treatment needed at the first dental visit (Person chi² P=0.000) (Table 3.6).

**Table 3.6 Correlation between the age groups and the treatment needed at the first dental visit**

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Prevention (%)</th>
<th>Restoration (%)</th>
<th>Pulp therapy (%)</th>
<th>Extraction (%)</th>
<th>Others (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>0</td>
<td>11.11</td>
<td>16.67</td>
<td>44.44</td>
<td>27.78</td>
<td>100</td>
</tr>
<tr>
<td>&gt;3-6</td>
<td>0</td>
<td>5.41</td>
<td>58.11</td>
<td>29.73</td>
<td>6.76</td>
<td>100</td>
</tr>
<tr>
<td>&gt;6-9</td>
<td>0</td>
<td>6.58</td>
<td>53.95</td>
<td>53.95</td>
<td>3.95</td>
<td>100</td>
</tr>
<tr>
<td>&gt;9</td>
<td>0</td>
<td>4.26</td>
<td>17.02</td>
<td>63.83</td>
<td>14.89</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>6.0</td>
<td>37.67</td>
<td>46.98</td>
<td>9.3</td>
<td>100</td>
</tr>
</tbody>
</table>

P-value=0.000


Chapter Four

Discussion

The present study is a cross sectional, dental-hospital based study, that investigated the age, chief complaint(s) and anxiety level at the first dental visit of Sudanese children attending the two major public Pediatric Dental clinics in Khartoum city (KTDH and U of K).

The median age at the first dental visit of our study population was 7.08 years, most children falling in the age group of (>6-9 years). Only 8.37% of the children were below 3 years of age, while 91.63% were older, within which one child in every 5 had visited the pediatric clinic for the first time after the age of 9. This was not in accord with the international recommendations, which recommend the age of the first dental visit to be around the child’s first birthday. However, other investigators [10, 16] [18, 19, 21, 22] reported similar results in the literature.

In contradiction to other studies [26, 36], which reported parents educational level as an important determinant of the children first dental visit, this study failed to reveal any significant association between the mother’s educational levels and the age of their
children’s first dental visit. One of the important limitations of this study is that it didn’t address other factors that might act as a barrier to dental care, including the socioeconomic factor, health insurance coverage, the availability of pediatric dental care and parental attitude towards dental care all of which may have an impact on the parental educational level.

Regarding the knowledge of companions (mostly parents) about the timing of bringing their children to the pediatric dental clinic for the first time, almost half of parents (49.77%) thought it should be whenever the child complains of his/her tooth and/or gum regardless of the age. Whereas only 26.98% thought it should be between 2-4 years of age. This reflects that Sudanese parents lack sufficient knowledge about the ideal timing for the first dental visit. This finding is in agreement with findings among Saudi parents reported by AL-Shalan et al. in his two studies (2002 and 2003) [37, 38].

When children and/or parents were asked about their chief complaint(s), the majority reported dental caries (74.42%), within which, dental caries combined with pain constituted the majority. These results are in agreement with those reported by Meera et
al.(2008) in both his prospective and retrospective studies \(^{[10]}\). Although 94.88% of parents thought that preventive dental visits are important and 72.09% agreed that primary teeth are important for every child, none came for prevention or orientation visit (0.00%).

Behavior of children attending for the first dental visit evaluated using FBRS showed that more than half of children were rated as level 3 (+), followed by level 2 (-), level 1 (--) and the least were classified as level 4 (++)_. Similar results were obtained from a study conducted by Shinohara et al.(2005) \(^{[61]}\) and colares et al.,(2002) \(^{[64]}\). However, Tenabe et al.,(2002) reported that level 3 was the most frequent classification, followed by level 4, 1 and 2 in children aged 5-12 years \(^{[61, 73]}\). In our study, however, two thirds of the children aged 1-3 were rated as (--) or at least (-).

This study revealed a statistically significant relationship between the level of dental anxiety and the age of the child; the older the child the less anxious he/she is. These results coincide with findings of other studies \(^{[61, 64]}\). Nevertheless, these findings contradict those of Tolendano et al., (1995) who failed to find a statistically significant relationship between dental anxiety and the
age factor\cite{74}. This contradiction might be due to the fact that Toledano et al., addressed an older age group (8-16 years), compared to our median age (7.08 years).

The international goal of first dental visit is to assess the risk for dental diseases, initiate preventive programs, provide anticipatory guidance and decide on the periodicity of other visits. It should be a completely painless visit, where the child is introduced to the dental environment. However, It was found that almost half of the subjects of this study needed extraction as treatment of choice for their chief complaint at this visit, followed by pulp therapy. None of the children under the study needed preventive measures only. Moreover, the study succeeded to uncover a significant association between the age and the treatment needed at the first dental visit; the older the age, the more invasive is the treatment needed. So instead of being a preventive and orientation visit, it changed into an invasive and emergency visit. These results coincide with findings of Clemencia & Cynthia and Al-Shalan et al\cite{26,38}.
Limitations of the study

- Children were recruited from a dental hospital based population, that may not reflect completely the community population.
- The behavior of these children was rated during clinical dental examination only and not during actual dental treatment. The rating might have been shifted towards a more negative behavior during treatment.
- Frankl Behavior Rating during the dental examination was carried out in an outpatient dental clinics while other children were being treated. So the children’s behavior and anxiety level might have been affected by other children’s behavior.

Strengths of the study

- This is the first study that addressed the determinants of the first dental visit among Sudanese children.
- The data were homogenous in most personal aspects, including, parental educational and occupational levels and residential area.
- The data were collected by direct interview with the child’s caregiver and not by a self administered questionnaire.
• All children were examined and behaviorally rated by the same investigator conducting the study.
Conclusion

- The median age at the first dental visit of Sudanese children does not follow the international recommendations (7.08 years).
- Orientation and prevention are not considered and preventive dentistry is yet to reach the common population in Sudan.
- The study revealed that there is no association between the mother’s educational level, and her child’s age at his/her first dental visit.
- It is evident that there is lack of parental awareness about the ideal timing and importance of the first dental visit.
- Dental caries and pain were found to be the main reasons for seeking dental care for the first time.
- The preventive goal of the first dental visit could not be accomplished in Sudanese children, since extraction was found to be their treatment of choice at this visit, and was found to be related to the age factor.
- Most of the children expressed Frankl level 3 during their dental examination. And significant relationship existed between children’s behavior and their age; the younger the child, the less cooperative he/she was.
Recommendations

- The importance of early first dental visit should be well emphasized by community health programs utilizing the dental manpower, physicians, parents and other caregivers, by assuring that the first dental visit be by age 1 year. This can only be attainable if primary oral health care is enthusiastically included as an integral part of primary general health care.

- In addition to the community health activities, public mass media can be a helpful means of oral health education in general, and information about the importance of an early first dental visit in particular. This will not optimize the oral health of the child population only, but will also improve the oral health of the future adult’s community as well.

- Providing practical and contemporary dental health information to parents before significant physical, emotional and psychological milestones, so that parents can anticipate impeding changes, maximize their child’s developmental potential and identify their child’s special needs.
• Pediatricians should also add to the workforce of oral health care providers, because they can address oral health through anticipatory guidance and refer high risk infants and young children.

• Adopting the concept of ‘Dental Home’, and parents/ caregivers establish it for infants by 12 months of age.

• The child’s first dental visit is an important occasion to address his/her fear and anxiety of dental care. Since, early exposure and familiarization of the child with the dental environment are seen as important measures in reducing anxiety in young children.

• The curriculum of all medical, nursing and allied health professional programs should include education in oral health including preventive dental measures; dietary counseling, oral hygiene instruction, fluoride application and fissure sealants in addition to recognition and diagnosis of the early presentation of certain oral diseases e.g. dental caries.
References


[16] Malik-Kotru G, Kirchner L, Kisby L. An analysis of the first dental visits in a Federally Qualified Health Center in a socio


[63] Hosey MT, Blinkhorn AS. An evaluation of four methods of assessing the behaviour of anxious child dental patients. International journal of paediatric dentistry / the British


Appendix I

University of Khartoum
Faculty of Dentistry
Dept. of Pedo, Ortho, & Preventive Dentistry

Interview & clinical examination forms

Registration No. 

Registration place: 1. Hospital. 2. Faculty .

Interview form

Is This the First Dental Visit for This Child?  No (immediately exclude the child) Yes (continue interviewing)

1. Patient’s personal data:

1. Interviewee: 1 Mother 2 Father 3 Other (specify)

2. Patient’s Name …………………………………………………
   Nickname…………………….

3. Gender: 1 M 2 F 

4. Age……Yrs……. mon. Date of birth: / / 

5. Residential area: 1 Khartoum province 2 Nearby city 
   3 Other provinces (mention)……………………………………..

6. Tel. #: Home ………… Mobile: ………………………………

7. Mother’s education: 1 Illiterate 
   2 Primary or secondary education 
   3 Higher education 
   4 Post graduation studies

8. Mother’s occupation: 1 House wife 
   2 In the medical field (Specify) …………


80
9. Father education:  
   1. Illiterate
   2. Primary or secondary education
   3. Higher education
   4. Post graduation studies

10. Father’s occupation:  
    1. Businessman
    2. In the medical field (Specify) ……
    3. Others (specify) ……………………

2. Medical history
   Does s/he go routinely to the pediatrician?  
   1. Often
   2. Sometimes
   3. Rarely
   4. Never before

11. Hospitalized before?  
    1. No  
    2. Yes

   If yes;  
   When? ……  Reason …………………….. Age …….. For how long

3. Dental history:
   12. Chief complaint: (C/C)
      1. Orientation and prevention
      2. Dental caries
      3. Deposits / bad breath
      4. Trauma
      5. Pain / sensitivity
      6. Malocclusion
      7. Missing / extra tooth
      8. Soft tissue lesions
     10. Discoloration.
     11. Other reasons, specify………..

4. Dental knowledge & attitude
   13. First dental visit should be made by age:  
       1) ≤ 1 yr
       2) 2-4 yrs
3) 4-10yrs

4) Only if a child complains of his teeth or gum

14. Preventive dental visits are:
   1) Important
   2) Not important
   3) I don't know

15. Primary teeth are:
   1) Important
   2) Not important
   3) I don't know

5. Anxiety level:

16. How would you rate your own anxiety (fear, nervousness) at this moment?
   1) High
   2) Moderately high
   3) Moderately low
   4) Low

17. Does your child think there is anything wrong with his/her teeth (i.e. does s/he feel that s/he has a dental problem?)
   1) No
   2) Yes

If yes:

18. How could s/he know this information?
   1) s/he is in pain nowadays
   2) From relatives
   3) From peers
   4) other, specify

19. Does your child have any idea that one of his/her teeth will be removed?
   1) No
   2) Yes

If Yes; source?

20. Does your child have any idea that s/he will receive an injection?
   1) No
   2) Yes

If Yes; source?

21. How do you expect your child to react in the dental chair?
   1) Very well
   2) Moderately well
   3) Moderately poor
4 Very poor

6. Clinical examination

23. Dentition:
   1 Primary
   2 Mixed
   3 Permanent

24. Examination of the chief complaint & clinical findings:

…………………………………………………………………………………………………………………………………………………………………………………………
…………………………………………………………………………………………………………………………………………………………………………………………

25. Investigations required

…………………………………………………………………………………………………………………………………………………………………………………………

26. Diagnosis of the chief complaint:

…………………………………………………………………………………………………………………………………………………………………………………………
…………………………………………………………………………………………………………………………………………………………………………………………

27. Treatment needed:

1. Preventive and orientation measures.
2. Conservative treatment
3. Pulp therapy.
4. Extraction
5. Others, specify ………………………………………

7. Behavior rating:

28. Frankl behavior rating of the child:

(1) rating 1 (--).
(2) rating 2 (-).
(3) rating 3 (+).
(4) rating 4 (++)
Determinants of the First Dental Visit in a group of Sudanese Children