ORAL HEALTH STATUS, ORAL HEALTH CARE AND DIETARY PRACTICES OF SPECIAL NEEDS CHILDREN

By

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for the degree of
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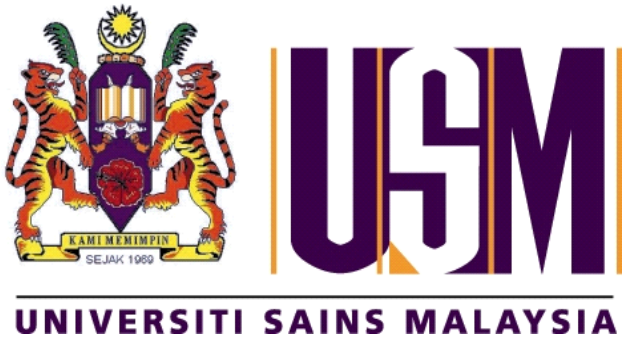

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Dedication

To my beloved husband and family, for their unconditional love, support and care....

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LIST OF ABBREVIATIONS

CI	Calculus index
CPITN	Community periodontal index of treatment needs
CSHCN	Children with special health care needs
dft	Decayed and filled teeth
DI	Debris index
DMFT	Decayed, missing and filled teeth
DT	Decayed teeth
FT	Filled teeth
MT	Missing teeth
NA	Not available
NOHSS	National Oral Health Survey of School children
OHI-S	Oral Hygiene Index- Simplified
OR	Odds Ratio
ppm	Parts per million
SD	Standard deviation
SES	Socioeconomic status
SPM	Sijil Pelajaran Malaysia
SRP	Sijil Rendah Pelajaran
SPSS	Statistical Package for Social Sciences
SQ KM	Square kilometers
WHO	World Health Organization

STATUS KESIHATAN ORAL, AMALAN PENJAGAAN KESIHATAN ORAL DAN AMALAN DIET KANAK-KANAK ISTIMEWA

ABSTRAK

Pengenalan: Kesihatan oral dipengaruhi oleh pelbagai faktor. Kanak-kanak istimewa lebih berisiko tinggi untuk tahap kesihatan oral yang lebih teruk berbanding kanak-kanak normal. **Objektif:** Kajian ini bertujuan mengenalpasti prevalen karies gigi, penyakit periodontal, status higin oral, amalan penjagaan kesihatan oral dan amalan diet serta merungkai hubungkaitnya dalam kalangan kanak-kanak istimewa. **Metodologi:** Kajian hirisan lintang ini melibatkan 125 kanak-kanak istimewa di sekolah-sekolah dalam daerah Kota Bharu. Indeks DMFT, CPI and OHI-S diguna untuk menilai prevalen karies, penyakit periodontal dan status higin oral. Pemeriksaan pergigian dilakukan di atas kerusi pergigian dan lampu mudal alih serta bas pergigian bergerak yang lengkap dengan kerusi pergigian dan lampu. Borang soalselidik amalan penjagaan kesihatan oral dan amalan diet diedar dan dilengkapkan oleh ibubapa. SPSS versi 18 diguna untuk kemasukan dan analisis data. Statistik deskriptif, 'simple' dan 'multiple logistic regression' diguna. **Keputusan:** Prevalen karies adalah 88.0% Lebih kurang 52.9% kanak-kanak ada karang gigi dan 33.9% mempunyai gusi berdarah. Hanya 34.4% kanak-kanak mempunyai tahap higin oral yang baik. Namun 88.3% daripada mereka melaporkan amalan penjagaan kesihatan oral yang baik dan 51.5% melaporkan amalan diet yang baik. Tidak terdapat sebarang hubngkait di antara prevalen karies, penyakit periodontal dan status higin oral dengan kebanyakan faktor sosio-demografi, laporan amalan penjagaan kesihatan oral dan amalan diet kecuali umur di mana kanak-kanak istimewa yang lebih tua mempunyai OR yang lebih tinggi untuk penyakit periodontal (P<0.05). **Rumusan:** **A**malan penjagaan kesihatan oral dan diet yang dilaporkan baik tidak semestinya memberi indikasi ketiadaan penyakit atau tahap penyakit yang rendah.

ORAL HEALTH STATUS, ORAL HEALTH CARE AND DIETARY PRACTICES OF SPECIAL NEEDS CHILDREN

ABSTRACT

Introduction: Oral health is multifactorial. Children with special health care needs are at greater risk for poorer oral health than normal children **Objectives:** This study aimed to determine the prevalence of dental caries, periodontal disease, oral hygiene status and oral health care practices and dietary practices and explore its associations among special needs children. **Methodology:** This cross-sectional descriptive study involved 125 special needs school children in Kota Bharu district. DMFT, CPI and OHI-S indices were used to evaluate caries experience, periodontal status and oral hygiene status respectively. Dental examination was done on portable dental chair with portable light and mobile dental bus equipped with dental chair and lighting. The oral health care and dietary practices questionnaires were distributed and filled by parents. SPSS version 18 was used for data entry and analysis. Descriptive statistics and simple logistic regression was used followed by multiple logistic regression analysis. **Results:** Prevalence of caries was 88.0%. About 52.9% of children had calculus and 33.9% had gingival bleeding. Only 34.4% of children had good oral hygiene. However, 88.3% of the children reported good oral health care practices and 51.5% reported good dietary practices. There were no associations between prevalence of caries, periodontal disease and oral hygiene status with most socio-demographic factors, reported oral health care practices and dietary practices except age whereby older children had higher OR of having periodontal disease ($P<0.05$). **Conclusions:** The reported good oral health care and dietary practices does not necessarily indicate absence of disease or low disease levels.

CHAPTER ONE

INTRODUCTION

CHAPTER 1

INTRODUCTION

1.1 Background

The mouth is part of the body; the body is responsive to the mind; and the mind is intertwined with the spirit (Daraby and Walsh, 2010). Personal oral care should be a lifelong concern since healthy teeth and gums are important to overall fitness and well-being (Sluder and Sluder, 1995). Teeth are important in enabling the consumption of a varied diet and preparing the food for digestion (Murray *et al.*, 2003). Digestion of food begins in the oral cavity, where both physical and chemical digestion begins. Oral digestion has an important impact on overall digestion and may influence the entire digestive process (Hoebler *et al.*, 1998). In the modern society the most important role of teeth is to enhance appearance and facial appearance is very important in determining an individual's integration into the society. Teeth also play an important role in speech (Murray *et al.*, 2003).

Oral health status is of increasing interest for the society (Cojo *et al.*, 2007) because it is an integral part of general health (Tanwir, 2008) and it can affect overall health and your quality of life (Perlman *et al.*, 2008). The promotion of general health, with oral health as an integral component has been recognized as one of the key factors for a successful and productive society. Health directly correlates with quality of life of both individuals and society (Petersen and Ogawa, 2005). Oral health is essential to children's overall health and it includes the structure and function of teeth and mouth. It is essential for

optimal nutrition, respiratory function, speech, communication and sensory capacity. Children with untreated caries may develop poor eating habits and speech problems. Its effects can cause absence from school, inability to concentrate and lack of self-esteem due to missing teeth. Healthy teeth and gums are important to overall fitness and well-being. People tend to eat, look, and feel better if they have good oral health.

Without doubt, oral diseases represent a major health problem for many young children and adolescents (Selekly, 2006). Dental disease is the most universal pathological condition affecting mankind (Bennett, 1998). Dental caries and periodontal disease are the most common oral diseases affecting mankind (WHO, 1997). They have historically been considered as the most important global oral health burdens (Petersen and Ogawa, 2005).

Dental disease is one of the most prevalent chronic diseases in humankind because individuals are susceptible to caries throughout their lifetime (Selwitz *et al.*, 2007). It is a progressive disease and becomes worse without treatment and hardly reverses itself unless incipient lesions. Untreated dental disease ultimately affects the entire body. It uniformly progresses to infection; acute then disabling chronic pain; loss of oral functions, speech and mastication, and malnutrition and its consequence (Bennett, 1998). In addition dental caries is a costly burden to health care services. There are evidence from many sources that dental caries is an ancient disease; it has been found all over the world in skulls from the time humans replaced hunting with agriculture as the main source of food for survival (Ettinger, 1999). Dental caries is the most costly human

disease in terms of treatment costs (Murray *et al.*, 2003) because restoration of teeth requires money, manpower and materials.

Periodontal disease is a general term used to describe specific diseases that affect the gingiva and the supporting connective tissue and alveolar bone which anchor the teeth in the jaws. Periodontal diseases are among the most common chronic disorders that have plagued humans for centuries (Williams, 1990). It affects all age groups leading to halitosis, gum bleeding and even abscess.

Health status is not determined solely by biology but social, economic, environmental and other factors are also important (Petersen and Ogawa, 2005). Regarding dental caries, several factors play a role in the etiology of this disease (Hargreaves, 1995). The factors related to the development of dental caries are extremely relevant in the disease process (Farsi, 2008). The development of dental caries is a complex interaction of etiologic factors and many modifying risk and protective factors (Axelsson, 2000). The oral cavity is composed of several unique environments in which micro-organisms thrive. These include the dorsum of the tongue, the mucosa, saliva, and supragingival and subgingival tooth surfaces (Perry and Beemsterboer, 2007). Since the beginning of this century it has been widely recognized that micro-organisms constitute an essential factor in the pathogenesis of dental caries (Bowen, 1972). Dental infections such as tooth decay and periodontal disease are perhaps the most common bacterial infections in humans (Loesche, 1986). Dental caries is a bacterial disease that is modified by environmental factors such as diet and conditions in the mouth (Murray *et al.*, 2003).

Sociodemographic factors have received considerable attention in the literature on their relationship with caries. Variables such as age, gender, race and socioeconomic status have been included as control variables to assess the contribution of biological, behavioral and cognitive factors in multivariate models of caries risk (Litt *et al.*, 1995). Socioeconomic factors strongly influence diet quality and health inequalities. Multinational and consumption pattern studies showed that this relationship may be influenced by sex, education level of parents and demographic variables (Iliescu *et al.*, 2008).

Socioeconomic status has received considerable attention in evaluating caries risk and has been measured in a variety of ways including parents' education, occupation, poverty status, and income (Litt *et al.*, 1995). Regardless of measurement, studies in aggregate showed children of higher social class generally have lower caries rates (Demers *et al.*, 1990). The social and economic burden associated with the rising incidence of dental disease in childhood requires serious consideration (Brown, 2009).

Diet and nutrition in dental health and disease have been major components studied over many years of research (Hargreaves, 1995). Although the terms diet and nutrition are often used interchangeably, they in fact have important differences that are particularly significant in the practice of dentistry (Palmer, 2003). Table 1.1 shows definitions of common nutrition terms. Food choices and dietary patterns are essential determinants of dental caries. In turn, the discomfort and possible tooth loss caused by dental caries can affect food choices and dietary patterns and may lead to dietary inadequacies and

compromised nutritional status (Palmer, 2003). Diet as a major risk factor for dental caries development also can affect general health.

Table 1.1 Common nutrition terms definitions

Term	Definition
Nutrition	The science of how the body uses food to meet its requirements for growth, development, repair, and maintenance
Diet	The pattern of individual food intake, eating habits, kinds and amounts of foods eaten. It is affected by a host of psychosocial factors such as ethnic background, tradition, religion, lifestyle, peer influence, personal attitudes, and health condition.
Nutrients	The chemical components of foods, which are needed by the body. It is found in various amounts and combinations in foods. There are more than 50 known nutrients which are classified into six classes: carbohydrates, protein, fat, vitamins, oxygen, minerals and water.
Foods	Substances that are consumed and provide nutrients to the body

(Palmer, 2003)

Carbohydrates, an essential source of energy for the body are generally classified into two different groups: sugars and starches. 'Fermentable carbohydrates' refers to any type of sugars or cooked starches that are digested by the oral bacteria to produce acids and constitute the most important substrate for oral microbial metabolism (Kandelman, 1997). There is a direct relationship between dental caries and the intake of

carbohydrates (Samaranayake, 2006). Also frequent intake of fermentable carbohydrates is the most important external modifying factors related to dental caries (Axelsson, 2000).

Sugar is a favored substrate for the cariogenic bacteria that reside in dental plaque, particularly the mutans streptococci. There is an association between sugar intake and dental caries in the modern society and limiting sugar intake is still important in the prevention of caries (Burt and Pai, 2001).

Low dental caries experience has been reported in groups of people who have a habitually low intake of dietary sugars (Murray *et al.*, 2003). The more sugar a population consumed and the greater the frequency of that consumption, the greater the prevalence and severity of caries was presumed to be (Burt and Pai, 2001). The classical studies of Robert Stephan in 1940 illustrate the central role of dental plaque acid in the caries process. Those studies showed that the resting plaque pH of caries free subjects is slightly alkaline (~7.2). Stephan found that plaque of caries susceptible subjects challenged with a glucose rinse, reduce pH levels from above 6 to well below 5 within 10 minutes. So when a subject frequently eat foods with high carbohydrates, it results in enrichment of the acid-sensitive bacteria such as streptococcus mutans and lactobacilli within the plaque microbiota which causes an increase of the pH-lowering and cariogenic potential of plaque (Lamont, 2008).

Prolonged oral retention of foods lead to extended periods of acid formation. Thus, fermentable carbohydrate dietary items which are slowly eliminated from the tooth

surface are more cariogenic (Kandelman, 1997). A clean mouth is one of the most important health needs for life and will be influenced by the ability to provide necessary oral health care support. With improved oral hygiene practices, there will be less plaque and therefore decreased gingival inflammation and oral disease (Rao, 2001).

It is worth noted that more teeth are extracted because of periodontal disease than because of tooth decay. Although the loss of teeth may not occur until later in life, the circumstances for tooth loss resulting from poor oral hygiene and care can begin in early childhood (Sluder and Sluder, 1995).

Dental caries and periodontal disease are so widespread that virtually everybody in the world, has either one or both of these conditions (Murray *et al.*, 2003). In children and adults suffering from severe tooth decay, the teeth are often left untreated or extracted to relieve pain or discomfort. Public health problems related to tooth loss and impaired oral function are therefore expected to increase in many developing countries (Petersen and Ogawa, 2005).

While oral problems may have a considerable impact on the general health status and quality of life of otherwise normal children, their effect on those with chronic and acute illnesses can be much more serious. Special needs children are at increased risk of sometimes life-threatening complications. The quality of life of mentally, developmentally or physically disabled children may be further compromised by dental pain and infection (Brown, 2009).

Special needs children refer primarily to children whose physical or intellectual capacities have been affected to some degree so that their participation in teaching and learning situation requires assistance (Werstwood, 2003). Disability is an objective and visible social phenomenon. Essentially it is a situation of physical and sensory impairment that affects specific people and is also affected by social, economic and other factors. Between 7 and 10% of the world's population is affected by some form of disability according to World Health Organisation data. About eighty per cent of disabled people live in developing countries. Concerns with overcoming the inequalities that continue to affect the disabled population has gradually gained momentum. It has a significant impact on the design of health and social policies. In many areas, however, disabled people are treated as invisible citizens. Up to this point dental science has failed to address the dental health needs of this highly vulnerable group (Di Nasso, 2009). The term disability in the context of delivery of dental care refers to any impairment developmental or acquired that restricts or limits daily activity in some manner (Bennett, 1998). People with special needs are also defined as those whose dental care is complicated by physical, mental, or social disability. They tend to receive less oral health care, or care of lower quality than the general population. Yet they may have oral problems that can affect systemic health (Davies *et al.*, 2000).

Most special needs individuals start their life with teeth and gums that are as strong and healthy as those of normal people. However, their diet, eating patterns, medication, physical limitations, lack of cleaning habits and attitudes of parents and health providers all contribute to poor oral health of those people (Kote, 2005).

Disabled children form a substantial section of the community, and it is estimated that there are about 500 million people with disabilities worldwide (Jain *et al.*, 2008). The number of individuals with disabilities and disorders is increasing, partly due to improved medical detection (Hallberg *et al.*, 2004). The number of people with disabilities and other special needs is growing dramatically (Glassman and Subar, 2008). With improvements in health care, disability and developmental problems in childhood have become more important health probelms (Amar-Singh *et al.*, 2008).

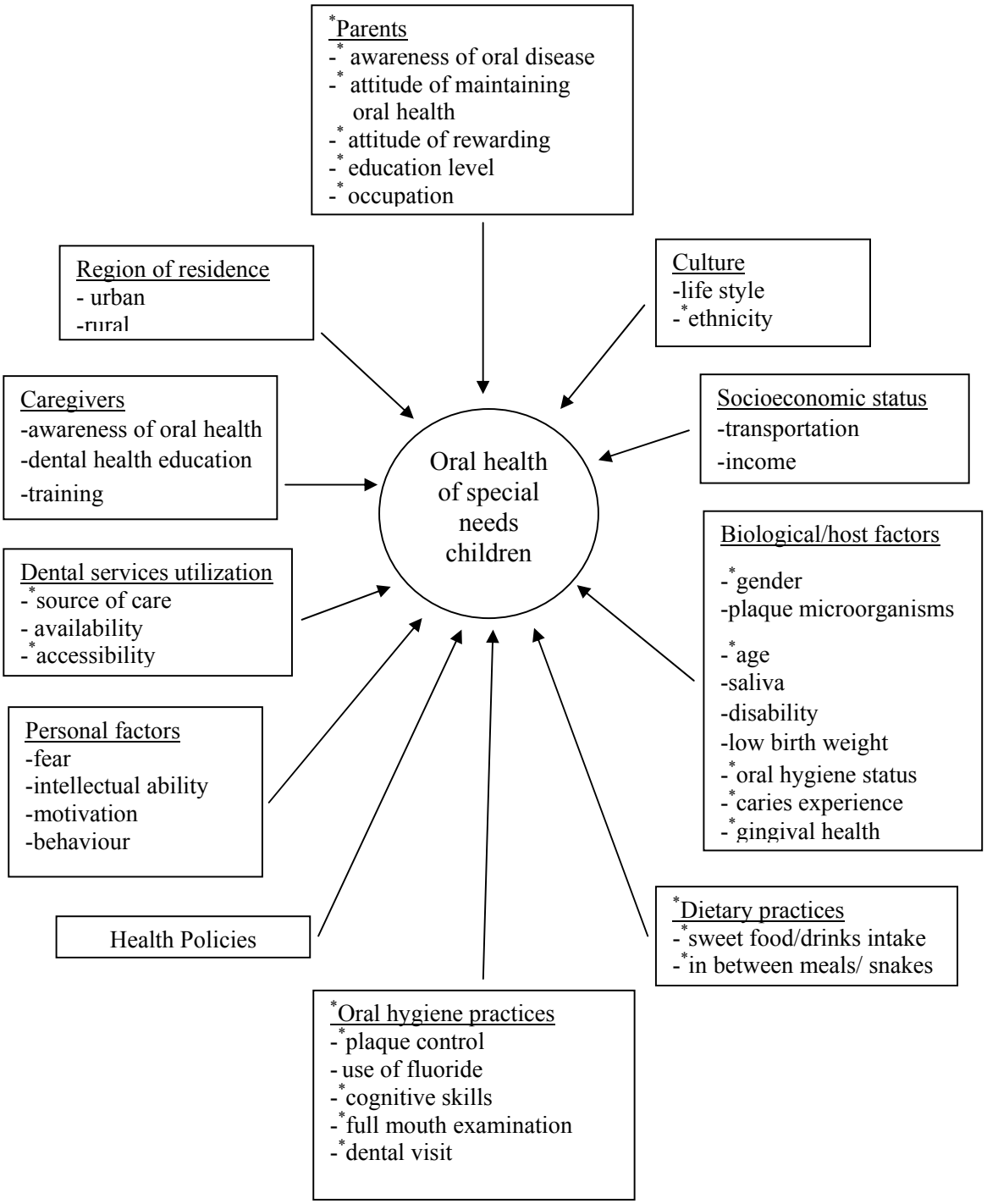
In patients with disabilities, the oral cavity and its functions are often affected for example problems related to eating, swallowing, speech and communication, chewing, drooling, esthetics, malocclusions and poor general dental health (Hallberg *et al.*, 2004). Individuals with special health care needs have been reported in the literature to have poorer oral hygiene and periodontal status, more untreated caries and fewer remaining teeth (Oredugba and Akindayomi, 2008; Desai *et al.*, 2001).

Down syndrome is often associated with missing teeth, malocclusion, and periodontal disease. In addition, children who exhibit this syndrome may have abnormally large or wide tongue and/or a tongue-thrust habit. Individuals with cerebral palsy may be physically unable to adequately brush and floss their own teeth. Many mentally retarded children may exhibit a hyperactive gag reflex. All of these conditions can make dental treatment and oral hygiene procedures difficult and complicated (Sluder and Sluder, 1995). In addition, they may have special characteristics making it necessary, when providing dental care to apply physical restriction techniques or even general anaesthesia (Posse *et al.*, 2003). Individuals with special health care needs have been reported to

have more untreated caries (Oredugba and Akindayomi, 2008). Inability to perform oral hygiene procedures contributes to the increased incidence of dental diseases in these patients (Nallegowda *et al.*, 2005). The literature has revealed conflicting results regarding caries experience in special needs children (Rao *et. al.,* 2001; Jain *et al.,* 2008; Oredugba, 2007). The higher incidence of caries could be due to lack of awareness about dental visits, irregular dietary habits, inadequate oral hygiene measures, lack of fluoridated water supply, easy availability of high sucrose-containing cheap food stuffs, parental neglect and lack of initiative towards oral disease prevention (Asokan *et al.*, 2008). Patients with epilepsy tend to have poorer oral health and they receive less adequate dental treatment in comparison to the general population. Possible causes for this phenomenon include medical and social factors. Karolyhazy et al., (2003) in their study found inflammation of gums and periodontitis more common among epilepsy group than control group where the percentage of healthy gum tissues is lower than the normal group in average one-seventh (1/7) of the controls. However findings reported by Jokic *et al.,* (2007) showed no statistically significant difference between disabled children and normal children in the caries prevalence.

Patients with physical disabilities are often unable to accomplish normal oral hygiene tasks because of physical limitations (Christensen, 2005). Problems arise when the patient becomes medically compromised, physically disabled, or mentally impaired. In this case, the dentist requires special skill and knowledge in order to treat these patients successfully. Oral health for this population depends on the number of willing health care providers within the locality in which they live (Newacheck *et al.*, 2000). Thus it is

Fg1.1 Conceptual framework of the study



*Aspects studied

obvious that prevention of dental caries and periodontal disease for people with special needs is a challenging problem in dentistry (Christensen, 2005).

1.2 Problem statement:

Disabled child patients with special needs such as physical and/or mental disabilities are considered as children with special needs (Cojo *et al.*, 2007). Many of these special needs children have physical disabilities which can prevent them from maintaining adequate oral hygiene or receiving proper dental treatment (Sluder and Sluder, 1995). They are often missed during oral health campaigns (Weraarchakul *et al.*, 2005). Inability to perform oral hygiene procedures contributes to the increased incidence of dental diseases in these patients (Nallegowda *et al.*, 2005). Considering that special needs children have serious psychological and intellectual problems, Jokic et al., (2007) highlighted that they should obtain special preventive care.

In recent years, there have been an increasing number of studies concerning the dental health of normal children. However, little attention has been directed to the dental health of special needs children, who actually require special care and attention. These children cannot maintain proper oral hygiene and dental health due to their disabilities (Kote, 2005). Also Waldman et al. (2001) mentioned that no nationwide studies have been conducted to determine the prevalence of dental diseases among the various populations with disabilities. Numerous local and regional reports, however, provide a general appreciation of the special needs children.

Access to sources of support such as disability support services, health services, equipment, home care, education, child care and recreation are just some of the challenges faced by special needs children and their families (Hanvey, 2002). For example chronic periodontal disease needs special attention and implementation of more than normal oral hygiene methods to slow or stop the periodontal disease process and to retain teeth for as long as possible (Christensen, 2005).

This group is often neglected because of ignorance, fear, stigma, misconception, and negative attitudes. The Court Report of London "Fit for the Future" recommended that the dental health of handicapped children should be brought up to, and maintained at the level of that is provided for other children. This recommendation was based upon studies that showed a higher prevalence of untreated dental disease in handicapped children than in normal children (Jain *et al.*, 2008).

Factors that determine caries experience and effects on the oral health overall may differ in different population. Kota Bharu is the most populated district in Kelantan. General dental treatment to the young population in the district is provided by the School Dental Services, Ministry of Health Malaysia. Reports indicated that caries prevalence is still high in normal children (Oral Health Services, 2004). So far there is no study available to identify the oral health status and causative factors responsible for caries, gingival diseases and poor oral hygiene among special needs children. Information on these factors is very useful for the planning of effective dental program for this group of children.

1.3 Rationale of the study

While oral problems may have a considerable impact on the general health status and quality of life of otherwise healthy children, their effect on those with chronic and acute illnesses can be much more serious (Brown, 2009). An unhealthy mouth can cause difficulty in chewing and swallowing, take the pleasure out of eating, and lead to a poor diet. As a result, decayed teeth and swollen, bleeding gums may also occur (Sluder and Sluder, 1995). Dental diseases are progressive, so the disease becomes worse without treatment and never reverses itself. Untreated dental disease ultimately affects the entire body, slowly progressing to infection. It can lead to acute pain then disabling chronic pain, loss of oral functions including speech, mastication, initiation of the digestive process, and malnutrition and its consequence (Bennett, 1998).

For the millions of people worldwide with intellectual and developmental disabilities, dental care is often not a top priority and takes a back seat to more pressing medical issues. However, maintaining good oral health should be a priority for everyone (Perlman *et al.*, 2008). The severity of dental diseases is significantly increased in the disabled population. The disability itself either directly contributes to oral disease or greatly exaggerates an existing condition (Bennett, 1998). Disabled children are also defined as those who are less capable of taking care of themselves but are often missed by regular oral health campaigns (Weraarchakul *et al.*, 2005). The provision of dental services, including dental treatment and oral hygiene maintenance to special needs children presents unique challenges to health care professionals as well as to the parents and guardians of these special patients (Sluder and Sluder, 1995).

Patients who have intellectual disabilities may not understand the need for oral hygiene or may not be able to perform it without help from caregivers. Often, caregivers are not aware of the necessity of preventive oral care, and they may neglect to provide it for those whom they are responsible for (Christensen, 2005).

Disabled people especially those mentally handicapped, have a lot of oral diseases and treatment needs. It is common to find gingivitis in early ages among them (Hernandez *et al.*, 2007). These individuals present unique challenges for oral health professionals in planning and carrying out dental treatment (Glassman and Subar, 2008). Individuals with special needs still have a difficult time finding appropriate sources of care and may not have adequate understanding and information about how to prevent dental disease (Glassman and Miller, 1998). Clearly, the methodology to be applied to improve oral health of people with special needs in various communities is different. Without a thorough analysis of the particular issues faced in each community or region, a unique and targeted strategy cannot be developed (Glassman and Miller, 1998). Before dental services can be planned, the extent of the problem need to be understood (Scott *et al.*, 1998).

Many of these children do not receive appropriate dental attention including oral hygiene and dental services. When children lack the support of specific regulatory interventions, and when medical and dental care are delayed, some of these children develop continuing problems (Sluder and Sluder, 1995). It is estimated that only about 20% of private practicing dentists are willing to accept patients with minimal disabilities (Bennett, 1998).

Therefore it is important to identify the possible associated factors relating to high caries experience, presence of periodontal diseases and poor oral hygiene for the planning of effective health promotion programs for this group of population in the community.

Dental caries and periodontal diseases have multifactorial aetiology. Based on the literature, most of the factors associated with caries and periodontal diseases among special needs children had been carried out in other countries, especially in the Western world. From the few regular oral health surveys and studies in some districts of Kelantan, sociodemographic factors and other factors that were associated with dental caries among normal children were explored. Available data on dental diseases in school children concentrated on the normal children among different age groups. To date there is no available oral health data regarding special needs children attending schools in Kota Bharu. Findings from this study will provide strong evidence to relevant authorities and parents regarding the immediate dental needs of these children. It will also allow realistic recommendations to the Ministry of Health Malaysia, school authorities and parents to gain more attention and extra care for these special needs children.

1.4 Introduction to the study area

Kelantan is located at the north-east coast of Peninsular Malaysia facing the South China Sea and covers a land area of 14,922 sq km. Its state capital, Kota Bharu, is a bustling town well connected to other major towns in Malaysia. It serves as the center for the state administrative and business activities. There are ten administrative districts in the state of Kelantan: Kota Bharu, Pasir Mas, Tumpat, Pasir Puteh, Bachok, Kuala Krai, Machang, Tanah Merah, Jeli, and Gua Musang. Kota Bharu district covers an area of 406 sq km out of 15,022 sq km of the total area of Kelantan state. The estimated population in Kota Bharu district is 509,400 (Departments of Statistics, Malaysia, 2010) making it one of the largest towns on the east coast of Peninsular Malaysia. Kelantan's population as of 2010, is estimated to be 1,670,500. Whilst Malays make up 95.0% of the population there is also a minimal percentage of Chinese (3.8%), Indians (0.3%) and others (0.9%).

The government dental services among children started essentially as a school dental service in the 1950s. Subsequently, a comprehensive and systematic incremental dental care programme was introduced in 1985. The aim is to render school children orally fit before they leave school. The services are provided via school dental clinics, school dental centers, mobile dental clinics and mobile dental teams.

There are 64 schools with special classes for special needs children in Kelantan and 17 of these are in Kota Baharu District. The seventeen schools and centres with the number of attending special needs children are shown in table 1.2.

Table 1.2 Schools and the number of attending special needs children respectively

No. of school	Name of school	No. of students
1	Sekolah Kebangsaan Dato'Hashim 1	43
2	Sekolah Kebangsaan Tanjong Mas	53
3	Sekolah Kebangsaan Sari Kota	42
4	Sekolah Kebangsaan Tanjong Indera Petra	46
5	Sekolah Kebangsaan Kedal Buloh 2	15
6	Sekolah Kebangsaan Demit 2	18
7	Sekolah Kebangsaan Sri Keterah 1	27
8	Sekolah Kebangsaan Kubang Kerian 1	43
9	Sekolah Kebangsaan Kg Sirah	10
10	Sekolah Menengah Kebangsaan Ismail Petra	55
11	Sekolah Menengah Kebangsaan Kota	41
12	Sekolah Menengah Kebangsaan Tanjong Mas	56
13	Sekolah Menengah Kebangsaan Ketereh	10
14	Sekolah Menengah Kebangsaan Panji	45
15	Pusat Dalam Komuniti Kem Desa Pahlawan, Bukit Cina	30
16	Pusat Dalam Komuniti Kubang Kerian, Kota Bharu	22
17	Pusat Dalam Komuniti Kg Chepa Sering	22

1.5 Conceptual framework

As oral health is recognised as a multidimensional construct, it is now considered important to assess the presence of oral diseases as well as their inflicting factors when measuring oral health in children. Dental care is consistently reported as one of the top medical needs of children with disabilities (Newacheck *et al.*, 2000). Although the precise aetiology of dental caries is unknown, scientific evidence incriminates the interaction of three factors that are diet, plaque and the tooth. Several studies demonstrate a positive correlation between the patterns of sugar intake and dental caries (Posse *et al.*, 2003). However, other studies showed no such association between sugar consumption and caries experience (Gordon and Reddy, 1985). In addition to dental caries another important dental problem identified was poor oral hygiene among these children (Glassman and Miller, 1998).

Such children may have more marked oral pathologies, either because of their actual disability or for other reasons of medical, economical or social nature, or even because their parents or carers find it very difficult to carry out proper oral hygiene (Posse *et al.*, 2003). Individuals with special needs still have a difficult time finding sources of care and may not have adequate understanding and information about how to prevent dental disease (Glassman and Miller, 1998). Living with a child with disabilities is a permanent stressor for the family and affects all aspects of family life and the well-being of the family members (Hallberg *et al.*, 2004).

Education which enable families to gain an understanding of the nature of their child's disorder is very much needed (Ducharmea *et al.*, 2007). Education of patients and parents or carers with regard to prevention and treatment of oral disease must be planned from an early stage. This will minimise disease and operative intervention since extractions and surgical procedures in particular, often produce problems for example in mentally disabled patients, minor surgery (simple extractions of two or three teeth) may generally be carried out under general anesthesia. Dental healthcare workers often need to be educated about this subject (Davies *et al.*, 2000). Parents' responsibilities include supervising and maintaining the oral hygiene of their children and their dietary routines (Wyne, 2007). Thus, they should be provided with more information regarding the importance supervising and controlling the dietary habits of their children (Al-Hussyeen and Al-Sadhan, 2006).

It is clear that the methodology to be applied to improve oral health of people with special needs in different communities varied according to many issues. Without a thorough analysis of the particular issues facing each community or region, a unique and targeted strategy cannot be developed (Glassman and Miller, 1998).

CHAPTER TWO

OBJECTIVES

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2.1 General objective

To determine the relationship of oral health status with oral health care, dietary practices and sociodemographic factors among special needs children attending schools in Kota Bharu district, Kelantan, West Malaysia.

2.2 Specific objectives

1. To determine the prevalence of dental caries among special needs children in schools of Kota Bharu in Kelantan, Malaysia.
2. To evaluate the periodontal status among special needs children of schools of Kota Bharu in Kelantan, Malaysia.
3. To identify the oral hygiene status among special needs children in schools of Kota Bharu in Kelantan, Malaysia.
4. To determine the oral health care and dietary practices of special needs children in schools of Kota Bharu in Kelantan, Malaysia.
5. To relate oral health status, oral health care practices and dietary practices of special needs children in schools of Kota Bharu in Kelantan, Malaysia.
6. To relate oral health status and sociodemographic factors of special needs children in schools of Kota Bharu in Kelantan, Malaysia.

2.3 **Research questions**

1. What is the prevalence of dental caries among special needs children in Kota Bharu?
2. What is the prevalence of periodontal status of special needs children in Kota Bharu?
3. What is the oral hygiene status of special needs children in Kota Bharu?
4. What are the oral health care and dietary practices of special needs children in Kota Bharu?
5. What is the relationship between oral health status with oral health care practices and dietary practices of special needs children in schools of Kota Bharu in Kelantan, Malaysia?
6. What is the relationship between oral health status with sociodemographic factors of special needs children in schools of Kota Bharu in Kelantan, Malaysia?

2.4 **Research hypotheses**

1. Poor oral health care practices will lead to high caries, poor periodontal status and poor oral hygiene.

2. Poor dietary practices will lead to high caries, poor periodontal status and poor oral hygiene.

2.5 Operational Definitions

2.5.1 Special needs children

Special needs children are children with learning disabilities, speech or language disorders, mentally retardation (intellectual disability), autism, hearing impairment, vision impairment, orthopaedic impairments or medical conditions (Werstwood, 2003).

2.5.2 Dental caries

Dental caries is a progressive irreversible microbial disease of the erupted calcified tissues of the tooth characterized by demineralization of inorganic portion and destruction of organic substances of the tooth (Rao, 2004).

2.5.3 Gingivitis

Gingivitis is the inflammatory response in the free gingival to accumulation of gingival plaque. Its symptoms are swollen, soft, red gums that bleed easily (Axelsson, 2002).

2.5.4 Prevalence of caries

Prevalence of caries refers to the proportion of population with one or more decayed, missing or filled tooth.

2.5.5 DMFT

DMFT is an index developed by the World Health Organization to describe the prevalence of dental caries in an individual. It is used to get an estimation illustrating how much the dentition until the day of examination has become affected by dental

caries. It is obtained by calculating the number of decayed, missing and filled teeth (DMFT) in the permanent dentition and decayed and filled teeth (dft) in the deciduous dentition.

2.5.6 Dental plaque

Dental plaque is defined as the non-mineralized microbial accumulation that adheres tenaciously to tooth surfaces, restorations and prosthetics appliances. It shows structural organization with predominance of filamentous forms that is composed of an organic matrix derived from salivary glycoproteins and extracellular microbial products and cannot be removed by rinsing (Axelsson, 2002).

2.5.7 Dental calculus

Dental calculus is calcified dental plaque composed primarily of calcium phosphate mineral salts deposited between and within remnants of formerly viable microorganisms (Lamont *et al*., 2008).

2.5.8 Oral health care practices

It is the method of cleaning the teeth and mouth such as tooth brushing, frequency of brushing, use of toothpaste etc. It also involves the parents / care givers role such as child's mouth examination, who is responsible for brushing the child's teeth, mode of dental attendance at clinics and reasons or difficulty for obtaining dental treatment and difficulty to bring special needs children for dental treatment.

2.5.9 Dietary practices