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The Relationship Between Malnutrition in Children and Dental Oral Health

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Introduction

The relationship between malnutrition in children and dental/oral health condition is still not yet established and often creating a controversy and limited knowledge (Luciana et al 2007), especially for those who live in disadvantage area(s) with low income status as they may not be aware of the effect of poor diet and insufficient nutritional component for the development and maintenance of a healthy teeth and mouth.

A number of research shows that there are still uncertainties and questions as to how exactly malnutrition in childhood has a direct affect on children dental health/oral health. Therefore, it is important to have sufficient information and an appropriate knowledge in order to provide an accurate data and evidence to ensure that effective intervention can be taken.

Hence, this paper aims to identify the cause of malnutrition, identify the correlation of malnutrition in childhood with dental/oral health, describe the important of dental/oral health in childhood and to investigate the effectiveness of the programme that is run in order to reduce the incidence of malnutrition among the people in general and children in particular who live in disadvantage area of Indonesia.

In order to explore as to investigate the needs and issues around children malnutrition which relate to dental/oral health in complex community in disadvantage area(s), leads to an analysis of the existing programs, it is essential to conduct a narrative literature review and search for publications that relevant to a number of topic area. The main theme of malnutrition in childhood which emerged in literature search was the contributing factor and was affecting children's health and their quality of life. Other factors such as lack of health services provision including dental health services, health promotion programme, and health service utilisation are considered to be a hindrance for the success of the existing program. Finally, an attempt has been made to complement these findings with concluding discussion of literature gaps and possible implication for practice.

Background/ significant of the issue

As one of social determinant of health and well being, the future success of a nation is determined by its healthy children particularly in early childhood. The health of children is influenced by many factors such as culture, environment, family structure, and socio-economic status (Keleher & MacDougall, 2009). A number of research shows that socio economic status plays a crucial role in contributing to the provision of the necessary nutritional component in children's food. In other words, nutritional status does have a significant role in malnutrition case in children and is associating to socio-economic status of the people (Alvarez & Navia, 2010).

The occurrence of malnutrition in childhood is becoming a significant issue and one of the greatest causes of morbidity and mortality (WHO 1999 and Gibbon et al 2009). WHO estimates that malnutrition contributes to 55% of childhood mortality both in developing and developed countries. Malnutrition can broadly affect to other aspect of life particularly in health. The insufficiency of vitamin supply has also shown to be a triggering factor to the existent of dental/oral diseases among children. At the same time, dental/oral diseases are contributing to the occurrence of malnutrition which is particularly evident among lower socio-economic communities in developing countries (Harold et al, 2007).

The relationship between tooth decay, tooth loss and malnutrition is a great relevance and it becomes a major concern among elderly people, owing to edentulism, and young children owing to early childhood caries. Therefore, it is important to note that poor nutrition components are contributing to the development of dental/oral health and would become a risk factor of the occurrence of dental/oral diseases in children. In other words, malnutrition does contribute significantly to the development of dental eruption and the occurrence of dental diseases.

In addition, poor oral health has been documented and is evident as a risk factor of mortality and early death. Dental/oral health is an integral part of the whole contributing factors to general health and well being and quality of life of individual and population (Schafer & Adair, 2000; Frank & Renee, 2003; Petersen, 2003; Baggess & Eldesein, 2006; Naidoo & Myburgh, 2007).

Search methods

Databases

The literature search was carried out on published materials by using the electronic databases. Databases were accessed through Finders University website. The main articles were retrieved from Medline (Ovid), CINAHL, Proquest and Web of Sciences databases.

Search engines

The search was done through Google in an attempt to examine the program; to find a number of incidences of malnutrition among children; the available services that are designed to combat the problems both by international and national organisations. This search led to websites such as Australian dental health, World health Organisation and others websites that relate to malnutrition, dental/oral health in children.

Google scholar was used to obtain information from the current scholarly articles which may have not been available through searching the databases. This type of literature search is particularly done to collect most relevant information of children malnutrition and dental/oral health in Indonesia and other countries (both develop and developing countries).

Keywords

A search was started by determining and giving several key words as a specific search terms (Magarey, Veale and Rogers 2000). Synonyms and Boolean operations were used. The words that used are: malnutrition, oral health, dental health, children, Malnutrition and children and oral health; malnutrition and children and health education, dental and Indonesia

Inclusion/exclusion criteria

Book reviews, articles, thesis, reports and bulletin which were not peer-reviewed were excluded from this search and when necessary keyword searches were extended only to abstract and title rather than whole document.

Time frame: to ensure data collection contains accurate or relevant information the data ranges from year 2004-2010. However, due to the limitation of the relevant articles to the topic, the time of data collection was stretched back to year 2000-2010.

Geography: Indonesia, developing countries such as India, Africa, Brazil; developed country such as United State, Australia, UK

Languages: only articles published in English were included in the search.

Age: the age of children were set at infant and child under 5 years. Pregnant women included in the search to find out the relationship between pregnancy and the health of the health of the baby born.

Further strategies and action

Other method of obtaining further information was done through checking related articles and the reference list of the most relevant articles in the articles taken. Finding similar tools within some of the databases were also used to reach more relevant resources.

The website mentioned in the publication or search through Google were accessed to collect information. Wherever website offered links to other relevant sites or organisation were also investigated.

However, due to difficult access, time limitation, and geographical reason, the key informant or the person in charge for handling the program in Indonesia was not able to be contacted. Yet, in order to further develop the program and further action, key informant is crucially needed to clarify certain issues that may arise during the search process.

Result of literature

A number of articles were searched from four databases and resulting a very large and broad outcomes, especially when giving keywords malnutrition, children, dental, oral health. The total of articles received was thousands, and therefore the collection was narrowed to 171 when operating Boolean. Based on the inclusion/exclusion criteria, the articles were narrowed to 71 articles. However, when the keyword Indonesia was included and limit the search year from 2000-current the total articles were 12. A total of resources collected are 40 articles. Most of the articles that relate to cases in Indonesia were only searched through Google by searching the specific website.

The main focus of these articles was the study in children malnutrition and their dental/oral health status; children with malnutrition condition as a risk factor and its effects on quality of health and quality of life; the difficulties in providing and accessing services and types of programme that are available for this particular concern.

Themes

First of all, the abstract, discussion, and conclusion of all articles were reviewed and were recognised as being brief notes about the focus areas that were chosen. The selected documents were reviewed in more depth to refine the research question and to identify the emerging major themes. Publications relevant to each theme were then grouped together accordingly and analysed from sociological perspective which is considered to be a social determinant of health and well-being. The issue of equal access and just in health promotion/ primary health care is also taken into account.

The major themes comprise of contributing factors to malnutrition and its affect to health status and dental/oral health condition; how the condition would impact on the quality of health and quality of life; and all the hindrance factors to health services utilisation.

Contributing factor of malnutrition and dental/oral diseases

Contributing factor of malnutrition

The literature review indicates that socio-economic status and inequity on the distribution of wealth has potentially lead to food insecurity and poverty are becoming major contributing factors leading to a poor dietary intake which is lacking in diversity and nutritionally inadequate in terms of both quality and quantity (ACF 2008; Baum 2008; Gibbon et al 2007; Muller & Krawinkel 2005; Nicolau et al 2005).

According to the World Food Programme (WFP) there are 13 million children in Indonesia suffer from malnutrition. In some of the districts of Indonesia, about 50% of infants and young children are underweight and malnourished. Report from health authorities in 2008 showed that 12 of Indonesian children aged less than five years died of malnutrition in the first six months. The major cause of this incident was mainly from eating habits in most family in Indonesia: feeding children with rice and water only. This poor feeding practice is also combined with the decline in breastfeeding and causing the increasing number of deaths among children that are malnourished. Poverty and low income status leads to the absence of family income is the major cause of children's mortality and morbidity (IRIN Asia Report). Similar conditions are found in Africa, India and other countries with high rate of malnutrition in childhood.

In addition, nutrient deficiencies or malnutrition in infant and children commonly associated with poverty in developing countries, are caused by multiple factors such as maternal under-nutrition, low calorie, poor nutrient complementary foods, high incidence of infections, lactate intolerant mother and their baby, and chronic illness or disease. Research shows that up to 40% of children less than 5 years of age living in poverty can be affected by protein energy malnutrition (Kirby and Danner 2009).

The other factor that can be potentially impacting as to become the contributing factor to malnutrition is limited knowledge and lack of information regarding to nutritional value and therefore influencing the nutritional intake of food consumption. Certain tradition and cultural practices and beliefs in rural and remote areas of Nusa Tenggara Province in

Indonesia, for instance, where women reportedly did not feed their newborn baby with colostrums and eating only partially boiled white corn, and remain inside of the house for the period of 40 days post partum as part of their tradition has contributed greatly to the death's rate among babies and young children (Stuttad in ACF report, 2008).

Contributing factor of dental/oral diseases

World Oral Health (from 2003 WHO report), showed that the incidences of dental/oral diseases is also found in developed countries where socio-environmental and so called modern lifestyle are taking place. Nevertheless, the greatest number of oral diseases mainly occurred in disadvantage countries and socially marginalised communities within the countries.

It was clearly defined that dental caries as a common dental disease is related strongly to lifestyle and self-controlled behavioural factor, including poor oral hygiene, poor diet and inappropriate feeding of infant (Harold et al 2007; Mobley et al 2009; Tonelli 2009). Similarly, early childhood caries (ECC) is more commonly found in children who live in poverty or in poor economic condition; and those who belong to ethical and racial minorities, born to single mother of parents with low educational level, especially of illiterate mother. In this population prenatal malnutrition or undernourishment are the main cause of enamel hypoplasia and periodontal diseases (Tonelli 2009) where oral hygiene is usually poor, exposure to fluoride is probably insufficient and there is a greater preference for sugary foods (Ribeiro NM & Ribeiro MA 2004). The study showed that the exposure of bacteria Streptococcus mutants is one of the highest reason to the occurrence of dental caries (Alvarez & Navia 2010).

Maternal oral health in particular, has significant implications for birth income and infant oral health (Wolf 2004). Nevertheless, the hormonal change, emotional condition, eating habit and lifestyle during pregnancy are also contributing to the problem(s) that may occur (Blagojevic, Brkanic and Stojic 2002; Mils & Moses 2002; Breedlove 2004; Tonelli 2009)

Other factors such as family behaviour and environment, parents' education level, family income, and children's living condition are also contributing to the occurrence of dental/oral diseases in childhood (Petersen, 2008; Friel et al 2009).

The right component of nutrients is crucial as it contributes to the development and maintenance of a healthy dental in childhood such as protein, calcium, vitamin A, vitamin C. Other nutrients that are needed for enriching oral health including vitamin D for maintaining bone, folate acid, ascorbic acid, iron and zinc to replenish the lining of gums, especially in the pockets next to the teeth. Protein, vitamin A and vitamin C are needed to produce the connective tissue that supports the teeth. Similarly, dairy products are important natural sources of calcium and nutrition for maintaining the strength of teeth and bones. Insufficient calcium intake would contribute to periodontal disease (Rugg-Gunn 2001 & AARP 2007; Moyniham and Petersen 2004)

<u>The correlation and impact on quality of health and quality of life</u>

Oral health and nutrition are integrally connected from the moment of conception of tooth eruption for the first time (Mobley 2005). In others word, nutritional status may affect the teeth development during the formation period and after the eruption in oral cavity (Luciana et al 2007). Dietary practices in pregnancy would determine infant and children oral health (Mobley 2005). The studies that were conducted among early childhood in Guatemala (Alvarez & Navia 2010) have shown that the nutritional status in early life appears to have a strong influence on tooth formulation and emergence in the initial process of tooth development as it is a very crucial and essential stage to the development of deciduous teeth.

Early malnutrition in childhood would affect skeletal growth and would result in decreased height. Similarly, poor nutrition affects tooth eruption and causing delayed for the emergence of deciduous teeth. It also appears to be a physiological connection between skeletal growth and tooth eruption (Alvarez & Navia 2010).

Dental or oral health has a strong connection to types of diet in many ways (Touger & Mobley 2003, WHO 2003). For instance, poor nutritional component in food intake would contribute to craniofacial development, oral cancer and oral infectious diseases. Dental diseases are contributing considerably significant to low self-esteem and poor quality of life and are expensive to treat (Petersen in WHO reports 2003; Moynihan & Petersen 2004). Oral health related to quality of life was evaluated using the Geriatric Oral Health Assessment Index (GOHAI), (Gil-Montoya et al 2002).

There are several common dental/oral diseases that were identified in literature review. The greatest number of dental diseases is dental caries and periodontal diseases. Dental caries is related strongly to lifestyle and self-controlled behavioural factors. The prevalence of dental caries was highest in the developing country. Changing lifestyles as well as type of food consumption and the emerging adoption of the Westernized globalization effect; one can estimate that teeth caries will increase in region such as Africa, including Indonesia owing to consumption of diet higher in sugar and inadequate exposure to fluoride (Lipoeto et al 2004; Harold et al 2007; Friel & Baker 2009; Moynihan 2010)

Literature review indicates that the affect of malnutrition and dental/ oral health to health status are influenced by each other (Harold et al 2007). Malnutrition in children can relate to their dental/oral health condition, the tooth decay; problem in oral system may effect to nutritional status and will lead to malnutrition status. In infants and toddlers, malnutrition can lead to the reduction of the immune system and predisposes which leads to other diseases such as chronic diseases and uncommunicable diseases in adolescent (Enwonwu et al 2004; Psoter 2006; Psoter et al 2008). In other words, malnutrition can cause poor oral health and poor oral health can indirectly cause malnutrition (Ehizele et al 2009).

Barriers to services utilisation and program

Some barriers to services utilisation and programme(s) identified in literature were the access to health and dental care and have been widely studied and generally found to be closely related to socioeconomic disparities. This condition was mainly caused by the high cost of dental/oral treatment (Rugg-Gunn 2001). In low income countries the cost of traditional restorative treatment of dental disease would probably exceed the available resources for health care (WHO 2007).

Limited funding, limited health workers and lack of staffs' level of appropriate knowledge, resources, facilities as well as geographical and climate factors have been causing the delivery of comprehensive services for health and dental health a real challenge(ACF 2008 and Baum 2008). In most poor countries, limited access to health services is a major barrier to health (Baum 2008). Policies, protocols and programme(s) aimed at prevention, detection and treatment of malnutrition are often lacking in clarity and consistency (Enwonwu et al 20040. These conditions are particularly taking place in rural areas that are located far away from the central district or provinces (ACF 2008).

In addition, the common barrier to services utilisation is low education and lack of information in community that may cause poor of knowledge and information regarding to nutritional value and were found to impact negatively on nutritional intake. This condition may be caused by the existence of illiteracy in the community or lack of the ability to read and write and therefore creating an absence of proper understanding to the information regarding the utilisation of available health services (Waterston 2003)

As mentioned in Baum (2008), one of the most possible significant barriers is the influence of some beliefs and traditional cultural practices. It occurred among the indigenous people in particular regions. For instance, difference conception in health practitioners and the Indigenous Australian in Australia; the traditional community in Nusa Tenggara Timur in Indonesia with which traditional values and beliefs are still strongly maintained and followed by the people in terms of protecting and looking after the infants, making it difficult for dental practitioners and health care workers to deliver health services required

(Stuttard in ACF report 2008). For this particular reason, health services organisation needs to ensure that their staffs are given the opportunity to undertake special training to increase their level of cultural awareness and knowledge. There is an urgency to take action in order to overcome the barriers to ensure that the services and programme can be delivered according to the needs to the community. The programme can be done in two terms: short term programme and long term programme.

Short term programme

Short term programme is mainly designed to achieve result in the immediate time frame. The programmes are:

* By involving the community participation to promote health and dental services that already exist within the community member in that area. It is based on Primary Health care approach (Fry & Baum 1992 cited in Baum 2008).

* Effectively promoting exclusive breastfeeding for the first six months of a child's life where appropriate. Promoting improved complementary feeding practice for all children aged 6-24 months as well as improving water and sanitation system (Nilza et al 2004; WHO 2007).

* Preventing dental diseases that suggested by Schafer & Adair (2000). Clinicians must begin risk-factor determine preventive counselling and preventive intervention within the first year of life. Paediatricians are one of the first points of contact and are in great positioned to begin the process as they see their patients for well-baby visits and therefore can provide anticipatory guidance to parents and other caregivers. Paediatricians are also in good position to see that every child has a dental home in addition to the medical home (Dorsky 2001).

* Mentoring and counselling pregnant women in particular area(s) by midwives. This particular programme has been widely implemented in Indonesia (Stuttard in ACF report 2008). Family visit before and after giving birth and educating the family about the

importance of consuming the right foods has also implemented. Educating the pregnant women regarding to dental/oral health and threat them where appropriate (Boggess 2008).

Dental health promotion and preventive strategies are clearly more affordable and sustainable (WHO 2007)

Long term programme

American Dietetic Association (ADA) stated that nutrition is an integral component of oral health. For long term programme, the ADA supports the integration of oral health with nutrition services, education, and research. Collaboration work between dietetics and dental professionals is recommended for oral health promotion and disease prevention and intervention. Scientific and epidemiological data suggest a lifelong synergy between nutrition and the integrity of the oral cavity in health and disease (Touger-Decker & Mobley 2003).

Long term programme(s) seem to be the most effective way to improve dental/oral health condition or status in children and to reduce the occurrence of malnutrition among children. By adopting the Ottawa Charter, the long term programme can be carried out as health promotion action and can be done in five broad areas (Fleming & Parker 2007) as follows:

* Constructing public policies that fully support health system. Health promotion goes beyond health care and making health issue as an agenda item for policy-maker (Enwonwu et al 2004; WHO 2007);

* Creating supportive environments by providing training and support for local community to create healthy environment through the production and the provision of local food in their land (home gardens) or countries where poor family would have an access to nutrient dense. Hopefully, by doing so, the needs of healthy food such vegetables, fruits, and meats can be met in target area(s) (Muller & Krawinkel 2005; Baum 2008, WHO 2007);

*Strengthening community action. Health promotion works through effective community action. Involving community in action to reduce malnutrition in childhood is proved to be

useful and efficient. Nevertheless, empowering the community leader in rural area can be a real challenge (WHO 2007);

* Developing personal skills of the health workers in community by improving and updating their knowledge and ability to handle the issue of early childhood malnutrition in order to reduce the incidences of malnutrition among children (Gordon 2007);

* Reorienting health services through an active collaboration work between local government and private sectors in order to provide better health services for the community in disadvantages area(s) in particular (WHO 2007).

Discussion

Gap in literature

Research context was very limited in Indonesia. The information that meets adequate information which explained the condition of children malnutrition and its affect to dental/oral health or dental/oral disease was inappropriate. However, the information about the incidences of malnutrition was clearly define, especially in rural or disadvantages area(s) which located so far away from the centre of district government (ACT 2008). This condition was mainly caused by the limitation of publication year of the article and also the limitation of research that has been done in Indonesia.

For that reason, the data collection was collected by comparing and combining the available information and studies that have been done in other developing countries, such as Africa, India and other countries in Southeast Asia region with similar situations, conditions, assessment programme and outcomes with Indonesia.

The available information to overcome the barriers of the intended services and programs were not mentioned specifically in the articles. In contrast, the management of barriers and program improvement was found in text books and sites as a not peer-reviewed.

Implication in practice

Dental practitioners and other care providers have the opportunity to educate and to conduct counseling program for pregnant women, parents, and families in order to promote healthy eating habit and healthy behaviors and should advocate for governmental policies and programs that decrease parental financial and educational barriers to achieve healthy diets. Families that are living in poverty, however, required greater efforts are to facilitate easy access for affordable healthy foods, particularly in urban and rural neighborhoods, to create an effective positive change in children's diets and to advance the oral components of general health.

Dental/oral health care practitioners are required to take an active action to integrate nutrition counselling program aimed at improving the oral health of their clients into their practice. Dental hygienist as one of dental health care practitioner can have a significant role in terms of preventing and minimizing the oral disease, as well as promoting the oral and general health of infant and children. Collaborative work with other health workers such midwives, nutritionists, nurses and communities' health workers as a partnership is also important.

The need for more research

Research can and should play a stronger role in addressing issue concerning oral health and malnutrition. The following are the issues that should be addressed in future investigations such as:

1. What are the significant cultural, political, economic, environmental, social and behaviour variable related to oral health status among the poor?

2. Are there specific and effective interventions that can mitigate some of the dental health and dental health care disparities?

3. Which preventive modalities are most effective for poorer communities?

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4. What is the motivation of poorer communities as far as oral health promotion and self-care are concerned?

Conclusion

There are several reasons to read a literature review and to carry out a literature review at the same time as there are many full lengths of articles which provide new conclusion and high level of evidence and information. Nevertheless, the limitation on the information of children malnutrition occurrence in Indonesia and the year of publication inevitably limit the in depth discussion of the paper.

Therefore, the information collected was done through comparing and combining similar studies took place in other developing countries and Southeast Asia Region.

Further research and specific study is required to seek better solution to the issue of children malnutrition and its affect to dental/oral health and diseases.

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