

## LOW BIRTH WEIGHT AND DENTAL CARES: IS THERE ANY ASSOCIATION?

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### ABSTRACT

**Introduction:** Low birth weight is defined as the newborn weighing less than 2500 g and it is a major public health problem. While a long list of mortality and morbidity conditions have been associated with low birth weight, dental conditions have not received much attention. Most of the study looks at relationship between low birth weight and enamel defects. The aim of this study was to **determine** the association between low birth weight and dental caries among 16-year-old school children in Tumpat district, Kelantan. **Methodology:** This is a case-control study. By using simple random sampling 473 16-year-old school children from nine schools in Tumpat district were recruited into this study. Based on clinical examination, subjects were categorized into three groups that were caries free, mild caries and high caries group. Weight at birth was identified based on birth certificate which was obtained by asking the children to **take** the questionnaire home to be filled up by parents. The data analysis involved ordinal logistic regression **analysis**. **Results:** Results showed that there was no significant **difference** of caries level in subjects with **normal** birth weight and low birth weight with  $p=0.317$ . **Conclusion:** This study failed to find any association between the low birth weight and dental caries among 16-year-old subjects in Tumpat district. Further study is needed to determine other factors that **may** be associated with development of dental caries in this group.

**Key words:** dental caries, low birth weight.

### INTRODUCTION

Birth weight of an infant has been used as an indicator of health of a community to reflect the quality of maternal health care. It is considered the most important **determinant** of the chances of newborn infant to survive, grow and develop healthily. The World Health Organization (WHO) (1984) has defined the term "Low birth weight" (LBW) as birth weight less than 2500 g (up to and including 2.499 g). As per this definition, babies with a birth weight of < 2500 g are classified as "Low birth weight", irrespective of the duration of the gestational period. LBW is a major public health and social problem. It is a **public** health issue because it is closely related to infant mortality and a host of morbidity conditions. It is estimated about 22 million LBW babies have been born worldwide annually. In the developed countries, the proportion of LBW among newborns is low and approximately two-thirds of LBW are pre-term babies. In the developing countries, the proportion of LBW is high. In countries where the proportion of LBW infants is high, the majority are suffering from

fetal growth retardation whereas where the proportion is low most of them are pre-term (WHO 1984). In Malaysia, in the year 1999, there were 6,038 **perinatal** death cases and 66.2% of them were LBW (Ministry of Health Malaysia 2002). Among the risk factors for LBW include **maternal** age (<17 and more than 34 years), maternal nutrition, high parity, close birth spacing (WHO 1984), low socioeconomic status, the mother's being unmarried and smoking and alcohol habits during pregnancy. Pregnant women who are exposed to even low doses of radiation around the head and neck also face a higher risk of delivering LBW babies. Full term babies are especially likely to be born underweight (Roberts 2005). Children of LBW are at increased risk of few conditions like cerebral palsy, seizure disorders, severe mental retardation and lower respiratory tract infections (Burt and Pai 2001). The growth and development of the teeth and jaw, soft tissues and hard tissue in oral cavity begin soon after conception. The term 'programming' has been used to describe the process whereby a stimulus of insult (for example, mother's health during pregnancy, birth weight, premature birth, breastfeeding or childhood infection) during critical period of development has lasting or life-long effects on the structure or function of **organs**, tissues and body system (Nicolau *et al* 2003). Dental caries may also be 'biologically programmed' in utero or early life. The relationship between LBW and dental conditions has not received much attention. Most of the

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related studies that have been done look into enamel defects like hypoplasia and enamel opacities of the teeth in the primary dentition stage. According to Seow *et al.* (1984), children born prematurely with LBW and neonatal rickets have 100% prevalence of defects (hypoplasia and opacities) in the primary dentition. LBW children also found to have small primary tooth-crown size (Fearne and Brook 2004). Rugg-Gunn *et al.* (1998) found that among 2-6 year-old Saudi boys, malnutrition, LBW, childhood illness were among the factors that related to the prevalence of developmental defects of primary teeth. Little is known about whether LBW infants are more prone to develop caries in later life. If maternal undernutrition during pregnancy is involved, then such link could be hypothesized. Kelantan is the state which the caries prevalence is among the highest in Peninsular Malaysia. It is among the poor state in Malaysia and Tumpat is among the poorest district. The prevalence of dental caries in Kelantan among 16-year-olds was 78.3% with DMFX(S) of 6.6 in the year 1997 (Oral Health Division 1998) whereas in Tumpat district the prevalence for the same age group in year 2004 was 81.2% (Wan Salina *et al.*). The aim of this study was to determine the association between low birth weight and different level of caries experience among 16-year-old school children in Tumpat district, Kelantan

**METHODOLOGY**

This is a case and control study where 473 consented 16-year-old schoolchildren from nine Sekolah Menengah Kebangsaan in Tumpat district, Kelantan were recruited into this study by using simple random sampling. Oral examination was done based on WHO method (1997) by using disposable mouth mirror and probe to remove debris. Based on clinical examination, subjects were categorized into three groups, caries free (DMFS score=0), mild caries (DMFS 1-7) and high caries group (DMFS ≥8). Cases were the mild caries and high caries group whilst the control group was the caries free group. Weight at birth was identified based on birth certificate which was obtained by asking the children to take the questionnaire home to be filled up by parents. Those with birth <2500 g were considered low birth weight and ≥ 2500 g were considered normal. Ethical clearance was obtained from University Sains Malaysia Ethical Committee and permission from Ministry of Education was also obtained. Data was analyzed using Statistical package for Social Sciences (SPSS) version 11 and STATA version 7. The data analysis involved ordinal logistic regression analysis.

**RESULTS**

Table 1 showed the proportion of LBW according to the gender and race in different caries level. Result showed that in all the three groups, proportion of females who born LBW were higher compare to males. Comparing among the races, Malay was the highest.

**Table 1:** Proportion Of Normal And LBW According To Gender And Race In Different Level Of Caries

Variable	Caries free (n=156)		Mild caries (n=157)		High caries (n=160)	
	Normal n (%)	LBW n (%)	Normal n (%)	LBW n (%)	Normal n (%)	LBW n (%)
Gender						
Male	63 (43.4)	2 (18.2)	39 (26.5)	3 (30)	41 (26.8)	2 (28.6)
Female	82 (56.6)	9 (81.8)	108 (73.5)	7 (70)	112 (73.2)	5 (71.4)
Race						
Malay	141 (97.2)	8 (72.7)	140 (95.2)	10(100)	145 (94.8)	7 (100)
Siamese	4 (2.8)	3 (27.3)	7(4.8)	0 (0)	6 (3.9)	0 (0)
Chinese	0(0)	0 (0)	0 (0)	0 (0)	2 (1.3)	0 (0)

To see the association between the LBW and dental caries, ordinal logistic regression was used. At the univariate level, results showed that there was no significant difference of the caries level in the normal and LBW in this study group with  $p=0.317$  (table 2). Multivariate analysis was

carried out to include other factors that may contribute to the level of caries (other factors not discussed here). The LBW variable was not in the final model and therefore confirmed that it is not a significant factor.

Table 2: Association Between LBW And Different Level Of Caries By Ordinal Logistic Regression

Variable	Caries free (n=156) n (%)	Mild caries (n=157) n (%)	High caries (n=160) n (%)	OR 95% CI	LR $\chi^2$ (df)	P value <sup>a</sup>
Birth weight						
Normal	145 (92.9)	147 (93.6)	153 (95.6)			
Low	11 (7.1)	10 (6.4)	7 (4.4)	0.70 (0.35, 1.40)	1.00 (1)	0.317

<sup>a</sup>Ordinal logistic regression

## DISCUSSION

Dental caries is still a common oral health problem in Malaysia and the prevalence in this study area was high. Although the etiological mechanisms of dental caries are well known, the early life events, which may contribute to caries, continue to be poorly understood. This study failed to find any association between LBW and dental caries in permanent dentition. Associations between LBW and dental caries were also not found in most of the related studies that have been done which focused in primary dentition stage. From a systematic review by Burt and Pai (2002), there were four studies done to see the association of LBW and caries risk and all studies were in primary dentition stage. The results from all the studies showed that there was no direct evidence to say that LBW is a risk factor for caries which may cause by not adequate number of the studies done. A finding from study done by Saraiva, and Castro (2004) among 2 to 5-year-olds in US does not support the association between LBW and dental caries. Peres *et al* (2005), did a study among 6-year-olds in Brazil and found that the association of LBW and high dental caries does not exist. In this study those with birth weight  $\leq 2500$  g were considered as LBW. There was also no association found between LBW and caries among 2-6 years of age US children (Shulman 2005). In a study among adolescents (permanent dentition) of 13-year-olds in Brazil found that those with LBW ( $\leq 2500$  g) were statistically significantly more likely to have high DMFT which showed that there is an association

between biological factors in very early life and level of caries in adolescents (Nicolau *et al* 2003). The findings support the arguments that dental caries experience is 'biologically programmed' in utero or early life, like other chronic diseases. This is contrast with the finding from this study where there was no significant difference of caries level between normal and LBW among 16-year-old adolescents. Result from this study was consistent with other studies (in primary dentition) that there were no relationship between caries and low birth weight. This conclusion can be made because caries in deciduous is a predictor for caries in the permanent stage (Li and Wang (2002). Although results showed no association between LBW and dental caries, when the clinicians are attending to a child who was born with LBW, the children should be considered at risk of caries because LBW is usually associated with social deprivation factors that can leave a child at high risk for caries.

## CONCLUSION

This study failed the find any association between the LBW and dental caries among 16-year-old adolescents in Tumpat district. Further study is required to determine other factors that may be associated with development of dental caries in this group.

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