



## Exploring the Determinants of Caries Experiences and Nutritional Status among Children with Cerebral Palsy

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### Dear Editor-in-Chief

Cerebral palsy (CP) is a permanent neurological disorder and reported as the most common motor disability among children that persisting throughout their lifespan. Children with CP (CWCP) reported to have significantly more dental caries and periodontal disease and impaired nutritional status compared to the normal peers (1,2). Parents/caregivers play an important role in maintaining their children oral health and nutrition (3).

We aimed to determine the parents/caregivers' oral health knowledge, attitude and practice (OHKAP) and factors associated with caries experiences and nutritional status among their children.

A cross-sectional study was conducted on 93 CWCP aged 5-17 years, and their parents/caregivers in one of the state in east coast of Malaysia. Informed consent was taken from the patients and guardians before the study.

Validated OHKAP assessed OHKAP of the parents/caregivers (4). Caries experiences were determined using decay, missing, filled (DMFT) index for permanent and dft index for deciduous teeth. Assessments of nutritional status were height-for-age-Z-score (HAZ), body mass index-for-age-Z-score (BAZ) and mid-upper-arm circumferences (MUAC). Dental plaque maturity score of the children was determined by using GC Tri Plaque ID Gel®; without staining [0], immature [1], mature [2] and acid-producing plaque [3] (5). 24-hour diet recall obtained and analysed in Nutritionist Pro™ Diet Analysis Software. The cariogenic food frequency

(CFF) indicates frequency intakes (never/rarely up to 2-3 times daily) of fifteen types of cariogenic foods and drinks, and categorized as least (0%-29.9%), moderately (30%-79.9%) and highly (80%-100%) consumed (4). Sugar Exposure Calculation measured the daily sugar exposure (DSE) scores and dental caries risks; 0-4=low, 5-7=moderate and  $\geq 8$ =high risk (6). Multiple linear regression (MLR) analysis was calculated and significant level was set at  $P < 0.05$ .

Most of the children participated were Malays, mean (SD) age of 12(4.9) years and 56% could not walk, crawl, creep and scoot. The median (IQR) of DMFT and dft were 0.5(4.00) and 3.0(8.00), respectively. Half of them were thin/severely thin and 90% were stunted/severely stunted. The mean (SD) MUAC was 18.7(5.37) cm and 90% had acid-producing plaque. The intakes of energy, protein, iron, zinc, vitamin C, vitamin A and total fat achieved the recommended nutrient intakes for Malaysian (7) compared to less consume of calcium and vitamin D. The cariogenic foods and drinks were consumed moderately by the children. Likewise, about half of the CWCP were categorized in the moderate risk of dental caries based on DSE scores.

MLR showed that the DMFT score was significantly associated with DSE ( $P < 0.001$ ) and mature/acid-producing dental plaque ( $P = 0.009$ ), which support the fact that that sugar exposures and mature/acid-producing dental plaque are the factors of dental caries (5,6). The dft score was significantly associated



with parents'/caregivers' OH practice ( $P=0.020$ ) due to the dependency of the children in maintaining oral hygiene and foods intake as supported by Carvalho et al (3). BAZ was significantly associated with mobility of children ( $P=0.005$ ), parents'/caregivers' OH practice ( $P=0.026$ ) and intakes of vitamin A ( $P=0.032$ ). Literature supports the association between mobility and BAZ, whereby the non-existent of physical activities and muscle pain led to the sedentary behaviour and overweight of the children (2).

Vitamin A with the functions of maintaining growth and epithelial cellular integrity might affect the weight and BAZ of the children (8). HAZ was significantly associated with children's age ( $P=0.001$ ), while MUAC with energy intake ( $P=0.031$ ) and calcium ( $P=0.003$ ). Obarzanek et al (9) supported the present finding. Body fatness was significantly associated with the energy intake. Calcium is needed for the growing children through late adolescence periods due to the increase bone mass accrual (10). Other factors, socio-demographic (sex of the children, dental visits, parents'/caregivers' educational levels and monthly income), parents'/caregivers' OH knowledge and attitude, intakes of protein, iron, zinc, vitamin C, vitamin D, total fat and total sugar, as well as CFF scores were not significantly associated with caries experiences and nutritional status of the CWCP.

In conclusion, DSE and mature/acid-producing dental plaque were associated with caries experience in permanent teeth while OH practice of parents'/caregivers associated with caries in deciduous teeth. BAZ associated with children's mobility, OH practice and vitamin A. HAZ was associated with the children's age, while the MUAC was associated with energy and calcium intakes. Hence, this study provides an insight for dental professionals towards controlling these associated factors to enhance the quality of life of this disadvantaged group of population.

## Conflicts of interest

The authors declare that there is no conflict of interest.

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