Relationship between dental caries and BMI among NGO-PSE's children in Cambodia

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Introduction and Objectives

Nowadays, general health and oral hygiene are influenced by various economic, social and cultural factors. The poor are the most affected by unequal access to health, in addition to being exposed to food insecurity, outdated or non-existent sanitation systems, and lack of drinking water source [1]. The study took place in Cambodia, one of the poorest countries in Asia touched by these inequalities, especially to access of dental care, a report of WHO showed that only 223 dental surgeons were in activity in 2012 in the country, far from the reference of 1/1000 people [2]. Dental caries share risk factors with diet [3,4]. The objective was to investigate the possible correlation between dental caries and BMI among children of the NGO "Pour un Sourire d'Enfant" in Cambodia.

Material and methods

A cross-sectional study was conducted on 344 students of 6-18 years with social criteria of inclusion of PSE. A dental mobile bus has been necessary to travel between PSE centre and rural schools. To describe the prevalence of dental caries, the DMFT (Decayed, Missing, and Filled by Teeth) has been collected with dental material as WHO criteria, 2013 [1]. Anthropometric measurements have been evaluating by BMI with material recommended by WHO Child Growth Standards, 2008 [5]. The BMI-for-age was calculated using the WHO AnthroPlus Software v.1.0.4 [6]. Statistical analysis was with SPSS v.24 using χ^2, Kruskal-Wallis and Mann-Whitney tests for univariate comparisons and correlation tests (Spearman, Kendall's tau and Pearson) for multivariate associations [7].

Photo of the dental mobile bus in front of a school

Results

The mean DMFT was 5.83 ± 3.84 and 95% of the participants had experience of caries, especially at low ages (6-11 years). [Legend 1]
The majority (67%) had normal BMI-for-age, 25% underweight and 8% overweight. [Legend 2]
There was an inverse and significant correlation between dental caries and BMI-for-age.[Legend 3]


Photos of dental caries during the mission.

Legend 1:

		N	Min	Max	Mean	Std. Deviation	P Value
Age		344	6	18	10.47	2.51	P(X²)=0.027; r= -0.435 (X² and Pearson correlation)
DMFT		344	0	19	5.83	3.84	
DMFT of Gender	Females	178	0	19	5.85	3.81	P= 0.870 (Mann-Whitney U Test)
	Males	166	0	17	5.80	3.87	
DMFT of Locality	PSE centre	33	1	16	5.27	3.77	P=0.462 (Mann-Whitney U Test)
	Rural Schools	311	0	19	5.88	3.91	

1a: Sample characteristics of age, DMFT, gender, locality.
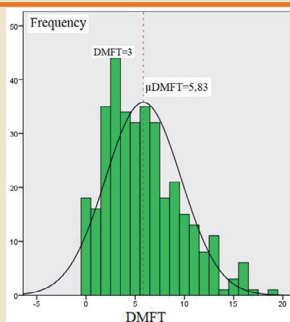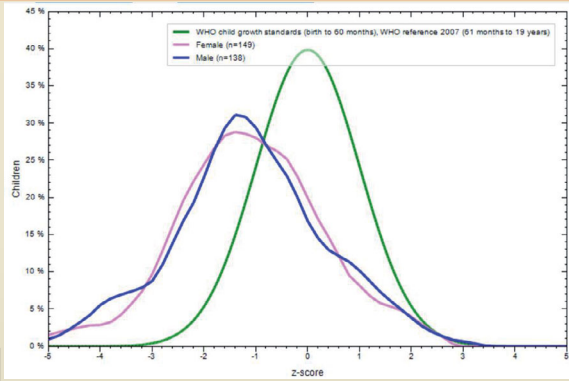

1b: Histogram of the frequency of number of patients in function of the DMFT.
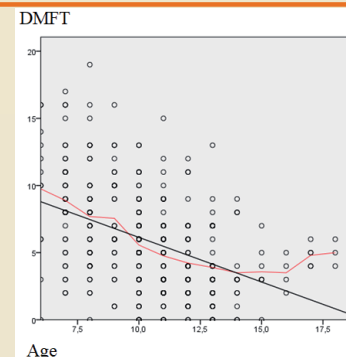
1c: Graph of the DMFT in function of the age.

Legend 2:

2a: Graph of BMI-for-age in function of gender

2b: Graph of BMI-for-age in function of groups of age

2a

Classes of BMI-for-age (5 to 3 classes)		Age Groups			Classes of BMI-for-age (n)
		6-11 y-old (n)	12-14 y-old (n)	15-18 y-old (n)	
1.Severe thinness	Class 1	19 / 23 → 43 (21.8%)	9 / 18 → 27 (35%)	1 / 1 → 2 (12.5%)	29 (10%) / 43 (14.8%) → 72 (25%)
2.Thinness					
3. Normal weight	Class 2	139 (70.6%)	43 (55.8%)	13 (81.2%)	195 (67%)
4. Overweight	Class 3	15 / 0 → 15 (7.6%)	5 / 2 → 7 (9.2%)	1 / 0 → 1 (6.3%)	21(7.3%) / 2 (0.7%) → 23 (8%)
5. Obese					
Total Children		197	77	16	290
X² of Pearson (For 3 classes of BMI-for-age*Age groups)		0.462	0.439	0.368	0.115

2b

Legend 3:

3a: Classes of BMI-for-age in function of mean DMFT

3b: Tests of correlation of BMI-for-age in function of DMFT

Classes of BMI-for-age	Mean DMFT	N	Standard Deviation	P value (Kruskal-Wallis H test)
Severe thinness	6.59	29	3.78	P value=0,098
Thinness	5.56	41	3.30	
Normal weight	5.82	196	3.94	
Overweight	4.45	22	4.03	
Obesity	1.50	2	2.12	
Total	5.72	290	3.86	

3a

	BMI-for-age / DMFT	P value
Pearson coefficient	-0.126	0.032*
Kendall's tau coefficient	-0.082	0.046*
Spearman's coefficient	-0.0118	0.045*

3b — * p<0.05 -> significative

Discussion

Many researchers have already investigated the association between dental caries and BMI-for-age, but results were inconsistent mostly in developed countries. A systematic review (included 50 studies) showed that 48% of studies reviewed didn't found any correlation probably due to carie's multifactorial causes; 35% found a positive correlation where caries were associated to overweight, consumption of sugar and developed countries ; and 19% found an inverse correlation where caries were associated to thinness, infantile malnutrition and developing countries [8,9,10]. Possible causes have risen in Cambodia due to the double burden of malnutrition at low ages and the recent trend of increasing consumption of diets high in sugar [11].

Clinical Implications

Need to monitor diet and caries in developing countries.

Conclusion

There was an inverse, statistically significant association showing that the increase in BMI-for-age corresponds to a decline in the number of dental caries. The reduced weight will be related to more dental caries. Future longitudinal studies will help to clarify the causality in this type of population.

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