Relationship between body mass index with dental caries and the effect of socio-economic status in rural and urban in Indonesia in the year of 2018

Hubungan antara indeks massa tubuh dengan karies gigi dan pengaruhnya terhadap status sosioekonomi daerah rural dan urban di Indonesia pada tahun 2018

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ABSTRACT

Introduction: Oral diseases with high prevalence in Indonesia are caries. Dental caries takes months or years to develop in most people. It is influenced by the consumption of food sugars, salivary flow, fluoride exposure, and preventive procedures such as tooth brushing and routine examination. **Aim**: Relationship between body mass index with dental caries and the effect of socioeconomic status in rural and urban in Indonesia in the year of 2018 **Method**: Survey of pilot pathfinder conducted in urban and rural areas of Gowa District, South Sulawesi, Indonesia in 2018 with a total number of subjects 416 people aged 11-14 years old. **Result**: Based on age, subjects in urban areas were highest at age 12 years (44.8%), whereas in rural area the most subjects were at the age of 11 years (37.9%). Based on sex, subjects in urban areas were 104 men (49.5%) and women 106 people (50.5%), while in rural areas were men 105 people (51.0%) and women 101 (49.0%). **Discussion:** There are conflicting findings from research on the population of adolescents in Gowa. In urban area of Somba Opu subdistrict, there is a relationship between BMI category and revenue to caries, whereas in rural area of Pattalassang subdistrict, there is a correlation between BMI category and occupation on caries. **Conclusion**: Overall BMI associated with dental caries. Although statistically significant the caries prevalence and experience were lower in overweight children in both the urban and rural areas of Gowa District.

Keywords: body mass index, dental caries, social economic status, rural, urban

ABSTRAK

Pendahuluan: Penyakit mulut dengan prevalensi tinggi di Indonesia adalah karies. Karies gigi membutuhkan bulan atau tahun untuk berkembang pada kebanyakan orang. Hal ini dipengaruhi oleh konsumsi gula makanan, aliran saliva, paparan fluoride, dan prosedur pencegahan seperti menyikat gigi dan pemeriksaan rutin. **Tujuan**: Hubungan antara indeks massa tubuh dengan karies gigi dan pengaruhnya terhadap status sosioekonomi daerah rural dan urban di Indonesia pada tahun 2018. **Metode**: Survei *pilot pathfinder* dilakukan di wilayah urban dan rural Kabupaten Gowa, Sulawesi Selatan, Indonesia pada tahun 2018 dengan total jumlah subjek 416 orang remaja usia 11-14 tahun. **Hasil**: Berdasarkan usia, subjek di wilayah urban terbanyak pada usia 12 tahun (44,8%), sedangkan pada wilayah rural subjek terbanyak pada usia 11 tahun (37,9%). Berdasarkan jenis kelamin, subjek di wilayah urban adalah laki-laki 104 orang (49,5%) dan perempuan 106 orang (50,5%), sedangkan pada wilayah rural adalah laki-laki 105 (51,0%) dan perempuan 101 (49,0%). **Pembahasan**: Ada temuan yang saling bertentangan pada populasi remaja di Kabupaten Gowa. Pada wilayah urban Kecamatan Somba Opu tampak ada hubungan antara kategori IMT dengan pendapatan terhadap karies, sedangkan pada wilayah rural Kecamatan Pattalassang ditemukan ada hubungan antara kategori IMT dengan pekerjaan terhadap karies. **Simpulan**: Secara keseluruhan IMT terkait dengan karies, meskipun tidak signifikan prevalensi karies dan pengalaman lebih rendah pada anak-anak yang kelebihan berat badan baik di wilayah urban maupun rural di Kabupaten Gowa.

Kata kunci: indeks massa tubuh, karies gigi, status sosial ekonomi, rural, urban
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INTRODUCTION

In recent decades, changes in lifestyle and diet have been accelerated by industrialization, urbanization, economic development and market globalization. This thing has significant health and nutrition impacts, especially through higher carbohydrate intake and lower levels of physical activities, especially among younger members of the population.[1,2]

Oral disease with high prevalence in Indonesia is caries. In South Sulawesi, Indonesia, the average DMF-T index in 12-years-old was 1.4. In fact, the average DMF-T index in children over the age of 12 is 6.0. This is supported by Gowa District Health profile data in 2015, which states that the number of elementary school children in Gowa District need 7118 treatments while the number of elementary school children receiving care is only 1,044 people (14,7%). Based on data obtained from the Agency for the Development and Empowerment of Human Resources of the Ministry of Health of the Republic of Indonesia, Dentist Medical Personnel utilized in Health Service Facilities in Gowa District especially in Pattalassang

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District is only 1 general dentist, while in Somba Opu Clinic there are 5 dentists.[3-6] Dental caries and overweight/obesity are two diseases that are influenced by predisposing factors such as diet, lifestyle, genetics, socioeconomic status, and other environmental factors.[1,2,7-10]

Other factors that may affect the relationship between caries and obesity, such as social class, have also been studied. When obesity and poverty are present, caries rates may increase. Studies that investigate the relationship between socioeconomic status and childhood obesity show conflicting results.[1,10,11]

The aim of this study is to explain the relationship between body mass index with dental caries and the effect of socioeconomic status in rural and urban in Indonesia in the year of 2018.

METHOD

This is a pilot pathfinder which is a survey involving one or two age groups that are the most important subgroups of the population most likely to experience different rates of disease in the urban and rural areas.[12] Survey was performed in Kecamatan Somba Opu (urban) and Kecamatan Pattalassang (rural) Gowa District, Indonesia.

After getting letter of ethics from the Ethics Committee of Dentistry Faculty, Hasanuddin University and the Research Permit Letter from Gowa Regency Government, socialization on dental and oral health surveys was conducted to the Gowa Regency government. The parents of the children were filled in informed consent to participate dental examinations, weight and height measurements. Each subject then filled out a questionnaire on dental and oral health maintenance. Process the data that has been obtained. The Assessment Criteria in this Survey use the Likert Scale and use the DMFT Index.[13,14]

The primary data were processed using SPSS 24.0. Data presents in tabular form and description. The Shapiro-Wilk normality test was performed to assess the distribution of caries data. Chi-square test was used to determine the prevalence difference between dental caries across BMI categories and socioeconomic status. Logistic regression analysis was also performed for multivariate analysis.[15]

RESULT

The survey was conducted on 9-14 April, 2018. From the survey, 416 sample subjects of adolescent age according to inclusion and exclusion criteria were obtained. Table 1 shows that based on age, the subjects in urban areas were highest at 12-years-old (44.8%), while in rural areas the subjects were highest at 11 years old (37.9%). Based on sex, survey subjects in urban areas were 104 men (49.5%) and 106 women (50.5%), while in rural areas were 105 men (51.0%) and 101 women (49.0%).

Tabel 1 Characteristic of survey subject (N=416).

Subject Characteristic		Frequency	
		N	%
Age (Years)	11	141	33.9
	12	171	41.1
	13	41	9.9
	14	63	15.1
Gender	Male	209	50.2
	Female	207	49.8
Location	Urban	210	50.5
	Rural	206	49.5

Source: Primary Data 2018

The relationship between caries experience was assessed by several variables consisting research on the BMI, Level of Education, Employment and Income and maintenance dental and sugar consumption. There is a relationship between caries experience (average DFT) with a BMI and revenues significantly in Gowa District urban area (Table 2).

In Table 3 shows the relationship between caries experience with BMI and Employment in rural area in Gowa. It shows that most subjects did not experience caries based on BMI 41 (26.6%) and had caries in 113 (73.4%) with the underweight category. In rural regions subject to most of caries experience is parents work as farmers are 55 people (72.4%). The education level of parents is the subject of caries experience 66 persons (68.0%) with a high school education level/ equivalent. The income of parents with the highest caries is Rp.1.500.000 to Rp. 2,000,000 as many as 38 people (71.7%).

There are differences in the BMI relationship with dental caries in urban area (Table 4). Children who are underweight greater risk of caries (OR = 4.5; CI =1.080-18.966) with p value is 0.039. In category of children with their parents as a civil servant have more risk of caries (OR = 0.19; CI = 0,045-0.861) with p value = 0.031.

Table 5 shows the correlation between BMI categories (OR = 7.77; CI =1784-33920) with p value is 0.006; by job category (OR = 0.029; CI = 0.002-0396) with p value is 0.008 against caries experience in the area of rural Gowa.

DISCUSSION

To evaluate the relationship between BMI and dental caries, the study also assessed effect of socioeconomic status. Subjects categorized as underweight, normal weight, overweight and obese. Although the growth reference charts of WHO is generally to the subject of age of 5-19 of which are used by the research-

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Table 2 Relationship between caries experience with research variables in urban area Gowa

Variables Research (Urban Areas)	DMFT				The p-value
	No caries		caries		
	n	%	N	%	
Body mass index					
Underweight	58	43.9%	74	56.1%	0.009 *
Normal	28	58.3%	20	41.7%	
Overweight	11	78.6%	3	21.4%	
Obesity	12	75.0%	4	25.0%	
Work					
Does not work	4	100.0%	0	0.0%	0.062
Farmer	2	66.7%	1	33.3%	
Self Employed/Traders	42	54.5%	35	45.5%	
Private Employees/SOE	34	50.0%	34	50.0%	
TNI/Polri	12	70.6%	5	29.4%	
PNS	15	36.6%	26	63.4%	
Education					
No school	0	0.0%	0	0.0%	0.513
SD/equivalent	4	80.0%	1	20.0%	
SMP/equivalent	2	40.0%	3	60.0%	
SMA/equal	53	53.0%	47	47.0%	
Diploma	5	45.5%	6	54.5%	
Bachelor	45	51.7%	42	48.3%	
Professor	0	0.0%	2	100.0%	
Income					
<Rp.1,000,000	16	80.0%	4	20.0%	0.017 *
Rp.1,000,000 - Rp 1,500,000	14	60.9%	9	39.1%	
Rp.1,500,000 - Rp.2,000,000	24	53.3%	21	46.7%	
Rp.2,000,000 - Rp.3,000,000	19	45.2%	23	54.8%	
Rp.3,000,000 - Rp.4,000,000	19	44.2%	24	55.8%	
Rp.4,000,000 - Rp.5,000,000	17	54.8%	14	45.2%	
> Rp. 5,000,000	0	0.0%	6	100.0%	
Frequency Brushing					
1 times a day	21	47.7%	23	52.3%	0.528
> 1 time a day	87	52.7%	78	47.3%	
Visits to Practice Dentist					
Been to the Dentist	94	53.7%	81	46.3%	0.125
Never go to Dental doctors	13	39.4%	20	60.6%	
Frequency of consumption of sugary foods per day in advance of meal time					
Sometimes or rarely	61	49.6%	62	50.4%	0.484
Once or more a day	47	54.7%	39	45.3%	
Frequency of consumption of fresh fruit a day					
Sometimes or rarely	57	46.7%	65	53.3%	0.077
Once or more a day	52	59.1%	36	40.9%	
Frequency of consumption of sugary drinks a day between meals					
Sometimes or rarely	66	53.2%	58	46.8%	0.542
Once or more a day	42	49.4%	43	50.6%	

Source: Primary Data 2018.

ers, this may not always be applied to the urban and rural population in Gowa for child growth patterns in different regions based on the time of puberty and nutrition, environmental factors, and genetic.[16-18]

There are conflicting findings from studies on populations teenagers in Gowa. On the territory of the district urban Somba Opu shown an association between BMI categories with revenues against dental caries, while at the district rural area Pattalassang found an association between BMI categories to occupation against dental caries. This is in line with studies of Yao et al.,[19] there is a positive association between obesity and dental caries. Furthermore, the choice of lifestyle and nutritional status worsen the common factors of obesity and chronic diseases such as dental caries. Meanwhile, Sede et al.[19] did not find a significant correlation between obesity and caries in their study. They stated that education and socioeconomic

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status either have a positive impact on the quality of life of children and eliminate the risk of chronic diseases such as obesity and damage teeth.[19,20]

Although not statistically significant, the prevalence of caries and experience lower in children who are overweight than children from other BMI categories. Similar observations were made in several longitudinal studies, and cross-sectional nationally representative sample. Though the underlying reason for this inverse association is unclear, several studies have been connecting with dietary habits. Diet plays an important role in overweight and obesity, as well as in the development of caries, as a result of high consumption of foods rich in fat and carbohydrates. The eating habits of children and adolescents are associated with socioeconomic status of their families, to the geographic location and to the area of residence, urban or rural. One of these studies showed that although the

Table 3 The relationship between caries experience with variable research in rural area Gowa

Variables Research (Rural Areas)	DMFT				The p-value
	No caries		caries		
	N	%	n	%	
Body mass index					
Underweight	41	26.6%	113	73.4%	0.007 *
Normal	17	45.9%	20	54.1%	
Overweight	2	40.0%	3	60.0%	
Obesity	7	70.0%	3	30.0%	
Occupation					
Does not work	7	77.8%	2	22.2%	0.029 *
Farmer	21	27.6%	55	72.4%	
Self Employed/Traders	25	35.7%	45	64.3%	
Private Employees/SOE	7	25.9%	20	74.1%	
TNI/Polri	3	42.9%	4	57.1%	
PNS	1	9.1%	10	90.9%	
Education					
No school	2	22.2%	7	77.8%	0.652
SD equivalent	16	39.0%	25	61.0%	
SMP/equivalent	7	25.0%	21	75.0%	
SMA/equivalent	31	32.0%	66	68.0%	
Diploma	0	0.0%	2	100.0%	
Bachelor	11	37.9%	18	62.1%	
Professor	0	0.0%	0	0.0%	
Income					
<Rp.1,000,000	1	100.0%	0	0.0%	0.311
Rp.1,000,000- Rp.1,500,000	11	23.4%	36	76.6%	
Rp.1,500,000- Rp.2,000,000	15	28.3%	38	71.7%	
Rp.2,000,000- Rp.3,000,000	21	38.2%	34	61.8%	
Rp.3,000,000- Rp.4,000,000	7	31.8%	15	68.2%	
Rp.4,000,000- Rp.5,000,000	5	35.7%	9	64.3%	
> Rp. 5,000,000	7	50.0%	7	50.0%	
Frequency Brushing					
1 times a day	21	30.9%	47	69.1%	0.724
> 1 time a day	46	33.3%	92	66.7%	
Visits to Practice Dentist					
Been to the Dentist	53	35.8%	95	64.2%	0.208
Never go to Dental doctors	14	25.0%	42	75.0%	
Frequency of consumption of sugary foods per day in advance of mealtime					
Sometimes or rarely	50	33.3%	100	66.7%	0.685
Once or more a day	17	30.4%	39	69.6%	
Frequency of consumption of fresh fruit a day					
Sometimes or rarely	47	34.3%	90	65.7%	0.442
Once or more a day	20	29.0%	49	71.0%	
Frequency of consumption of sugary drinks a day between meals					
Sometimes or rarely	45	34.6%	85	65.4%	0.402
Once or more a day	22	28.9%	54	71.1%	

Source: Primary Data 2018

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Table 4 Multivariate analysis research variables with caries experience in an urban area

Variables (Urban Areas)	OR	CI	The p-value
Body mass index			
Shortage Weight	4.526	1.080-18.966	0.039 *
Overweight	2.745	0.601-12.533	0.193
obesity	1.148	0.170-7.759	0.888
Work			
farmer	0,000	-	0.999
Self Employed/Traders	0.272	0.020-3.673	0.327
Private employees	0.614	0.258-1.465	0.272
TNI/Polri	0.594	0.250-1.411	0.238
PNS	0.196	0.045-0.861	0.031 *
A visit to the doctor Teeth			
Not been to dentist	0,000	-	0.999
Been to dentist	0.609	0.258-1.440	0.259
Frequency of consumption of fresh fruit in a day	1.683	0.895-3.164	0.106

Source: Primary Data 2018

Table 5 Multivariate analysis of study variables with caries experience in the area of rural.

Variables (Rural Areas)	OR	CI	The p-value
Body mass index			
Shortage Weight	7778	1784-33920	0.006
Overweight	3307	0684-15979	0.137
obesity	4,710	0365-60697	0.235
Work			
Does not work	0029	0002-0396	0.008 *
farmer	0270	0032-2292	0.230
entrepreneur	0118	0008-1676	0.114
Private employees	0211	0025-1814	0.156
TNI/Polri	0431	0043-4330	0.148
PNS	0181	0013-2444	0.198

Source: Primary Data 2018

parents of children who are overweight may limit the consumption of sweet foods, thereby causing fewer caries development, children remain overweight because they consume more calories than they spend. Another study argues that children who are overweight may be eating more fatty acids, but less sugar, compared with healthy children or underweight.[21-25]

In this survey, suggest that in the urban and rural area of Gowa, high caries prevalence found in children with underweight category. In addition, children from low socioeconomic status are at greater risk for experiencing dental caries than children from high socioeconomic position (SEP). It can be seen from a systematic review that low SEP is associated with greater caries experience, both in adults and in children.[26,27]

Behavioral factors different in rural and urban areas. Urban subjects reported oral hygiene habits better and more frequent dental examination, but the consumption of sugary snacks and drinks are higher; in this group of subjects having a large number of caries lesions with lower severity compared with teens who live in rural areas. In rural areas, lack of health care facilities and poor oral hygiene habits were reported. These findings may explain why even if the number of children with caries lower, higher severity. Based on a survey that the frequency of consumption of sweet foods, fresh fruits and sugary drinks is not associated with the presence of dental caries. The relationship of this research is influenced by several factors such as salivary flow and composition, using fluoride, the age after eruption of the teeth, and consistency and the amount of sugar that shows bias conditions on this study.[24,27-35]

The main findings of this study, namely a lower caries prevalence and experience in children is overweight, and the effect of SEP on this relationship, in contrast to the literature on the intake of sugar-free, caries, and nutritional status.

From this study, it was conluded that overall body mass index associated with dental caries were studied in this population. Although not statistically significant prevalence of caries and experience lower in children are overweight in the region both urban and rural region of Gowa.

CONFLICT OF INTEREST

The authors declare have no conflict of interest, financial or otherwise.

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