

THE EFFECTS OF VIEWING FOOD IMAGES ON SOCIAL MEDIA ON SWEETNESS PERCEPTION OF UNIVERSITY STUDENTS

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ABSTRACT

Introduction: Epidemic of obesity in Malaysia comes to a serious stage that leads to a concern of sugar intake under the influence of food-related social media accounts. It is relevant to study the association of social media on sugar sensitivity due to the rising of obesity epidemic along with the advancement of media nowadays. **Aims:** The objectives of this study were to measure the prevalence of viewing food-based Instagram account followed, to evaluate the relationship between viewing food-based Instagram account followed and anthropometry measurement and to assess the influence of viewing food images on Instagram on sweetness perception. **Method:** A total of 100 subjects among IIUM students were recruited. Methodology used in this quantitative study was cross sectional experimental study design. Demographic information, anthropometric data such as height, weight and body fat percentage as well as number and percentage of food-based account followed on Instagram were recorded before subjects proceed with the test drink. Subjects were required to taste a sample of standard dilution liquid that contain 15g of sugar in 250 ml water which is prepared in disposable cup before and after viewing food-related accounts followed. Subjects then will rate the sweetness perceived on Visual Analogue Scale (VAS) each time after test drink. The score of VAS before and after Instagram-viewing were analyzed using SPSS version 25. **Results:** Median percentage of subjects who followed food-based account on Instagram was 0.64%, ranging from 1 to 30 accounts. The relationship between food-related Instagram account followed and anthropometry measurement is not significant. However, present study found that there is significant correlation between the percentage of food-related Instagram account followed and sweetness perception. **Conclusion:**

This research indicates that the association of social media viewing could increase the sweetness perception of university students that may lead to the overconsumption of food intake.

KEYWORDS: Obesity, Food-related social media account, Instagram, Sweetness perception, Visual Analogue Scale

INTRODUCTION

The prevalence of obesity keeps on increasing that lead to many metabolic diseases such as diabetes, hypertension and cardiovascular disease. According to the recent National Health and Morbidity Survey (NHMS) 2019 reported that, half of the adult populations are obese and overweight. Even though there have been many measures are taken by healthcare practitioner to combat this problem, the case show no sign of declining (Wan Abdul Hamed & Abd Aziz, 2020).

Malaysia is a developing country, hence there is abundance of food choice available as an impact from nutrition transition from all over the world. Along with the development of digital era, social media platform especially Instagram has been used to share many appetizing cuisines with high quality visual that makes users engaged to it (Mejova, Abbar & Haddadi, 2016). According to Statista, Instagram is a network of younger users where more than half of the global Instagram user population is younger than 34 years old. The largest of the demographics are within 18-24 years old age group.

A study reported that 10% of pictures been shared on social networking site (SNS) consists of pictures of appetizing and alluring food (Hu, 2002). However, these food images are much more tempting than the actual foods that are portrayed. The way food is presented virtually give impact on people taste perception that subsequently affect the food choices. As supported by Afdallyna et al. (2019), expectation plays a role in food taste which is influenced by first visual impression through appetizing food image and its actual taste. According to the literature available, elements from sensory cues such as texture, flavor and appearance from food bring effects to the taste perception of individual (Afdallyna et al., 2019). Besides, colour is one of the most attractive elements that can bring high impact as well as the physical state of food (Spence & Okajima, 2011).

The close interaction between taste and sight was supported by van der Lann et al. (2011) which affirm that food selection is firstly guided by the visual system. This is caused by a remarkable reaction in the brain particularly in the amygdala and associated infer temporal region (LaBar et al., 2001). Moreover, when people think or watch desirable food, they tend to salivate more, in particular when associated with the expectation to eat that food (Keesman et al., 2016).

It is believed that viewing photos and videos of food often can alter the taste

perception particularly sweetness perception. Sweetness can create pleasure sensation and enjoyment to the individual thus influences their food consumption (Lowe & Butryn, 2007). Therefore, this study highlighted how the sense of sight, particularly viewing food-based accounts on Instagram, influences sweetness perception that may lead to the overconsumption of food.

METHODS

Overview

Subjects were advised to take a meal at least 2 hours before carrying out the research to avoid bias. Subjects were required to measure height and weight before completing the personal information and social media (Instagram) information on self-administered form given. After that, subjects were asked to sip plain water before tasting the test drink and rate the sweetness perception level on Visual Analogue Scale provided. Subjects then were given 10 minutes to view food images on Instagram based on the food-account followed by them. Again, subjects were required to sip plain water before tasting the same test drink. Subjects were required to rate the score of the sweetness perceived based on the test drink.

Subjects

The study used convenience sampling to recruit the subjects. In total, 100 subjects (male (n=36) and female (n=64)) from the International Islamic University Malaysia (IIUM) Kuantan campus were voluntarily recruited. Informed consent was obtained from the subjects. The inclusion criteria includes population of IIUM undergraduate students aged 18 to 25 years old whom have an Instagram account and followed food-based account as well as have good health status. Subjects who did not fulfill the criteria above were excluded from the study.

Anthropometry and BMI classification

Subjects went through anthropometric measurement to determine their body mass index (BMI) group. Weight and body fat percentage were assessed by OMRON body fat analyzer while height was measured by SECA stadiometer. According to WHO, subjects with BMI $<18.5\text{kg}/\text{m}^2$ is categorized as underweight, BMI $18.5\text{kg}/\text{m}^2$ to $24.9\text{kg}/\text{m}^2$ as normal, BMI $25\text{kg}/\text{m}^2$ to $29.9\text{kg}/\text{m}^2$ as overweight and BMI $>30\text{kg}/\text{m}^2$ as obese. The demographic section questionnaires include age, sex, year of study and kulliyah (faculty) of the subjects.

Test drink preparation

Test drink was prepared in the form of liquid. Plain syrup was chosen as sample because it does not contain any other ingredients that may mask the sweetness level besides considering the cost expenditure to prepare the samples. The standard dilution syrup contains 15g of sugar which is similar to 3 teaspoon in 250ml of water. Samples were prepared in disposable plastic cups right before the tasting session starts. The sample was served at room temperature for practical reasons.

Rating the score of sweetness level

Subjects were instructed to rate the level of sweetness represented by the test drink onto scale paper given, ranging from 'not sweet at all' to 'sweetest I ever tasted'. Sweetness perception in the population can be identified through the mean total scores of rating marked onto Visual Analogue Scale (VAS) from all of the subjects. VAS is a measurement device that measure subjective characteristics or attitude that has range across a continuum of values. It is often used to measure the intensity or frequency of various symptoms in epidemiology and clinical research.

Instruction: Please rate your answer accordingly. Please answer all the questions.

1. How do you perceive the sweetness of this food item?



Figure I A 10cm Visual Analogue Scale used to rate sweetness perception of the test drink

Statistical analysis

All the data collected were analyzed further by using Statistical Package for Social Sciences (SPSS) version 25. The statistical analysis of results included descriptive and correlation test analysis.

RESULTS

Characteristics of subjects

Subjects consist of 64 females and 36 males who are undergraduate students around IIUM Kuantan. Participation was based on the criteria fulfilled for subject recruitment and their availability. The average mean age of all the 100 subjects participated is 22.1 ± 1.2 years with 10% underweight, 66% normal and another 24% are overweight and obese. The mean BMI of total subjects is 22.5 ± 3.6 kg/m² ranging from 17.2 to 35.5 kg/m². Moreover, more than half of the subjects have normal BMI and body fat percentage as displayed in Table I.

Table I Demographic data of subjects

Characteristics	Frequency	Range	Mean \pm SD
Age (years)		19-24	22.1 \pm 1.3
19	1		
20	18		
21	9		
22	20		
23	44		
24	8		
Gender			
Male	36		
Female	64		
Weight (kg)			
Male		49.8 - 82.0	65.5 \pm 8.1
Female		38.8 - 85.2	53.2 \pm 10.9
Height (m)			
Male		1.6 - 1.8	1.7 \pm 0.1
Female		1.4 - 1.7	1.6 \pm 0.1
BMI		17.2 - 35.5	22.5 \pm 3.6
Underweight	10		
Normal	66		
Overweight	20		
Obese	4		
Fat percentage (%)		Total	8.2 - 38.3
Normal		74	22.2 \pm 6.9
Male	26		
Female	48		
Abnormal		26	
Male	10		
Female	16		

On average, majority of the subjects were from Kulliyyah of Allied Health Sciences out of all the kulliyyahs in IIUM Kuantan while only 1 representative from

Kulliyyah of Medicine and Dentistry. As for other kulliyyah such as Kulliyyah of Science, Pharmacy and Nursing were 10, 7 and 3 respectively. Most of the subjects were year 3 students, followed by year 1, year 4 and year 2 students.

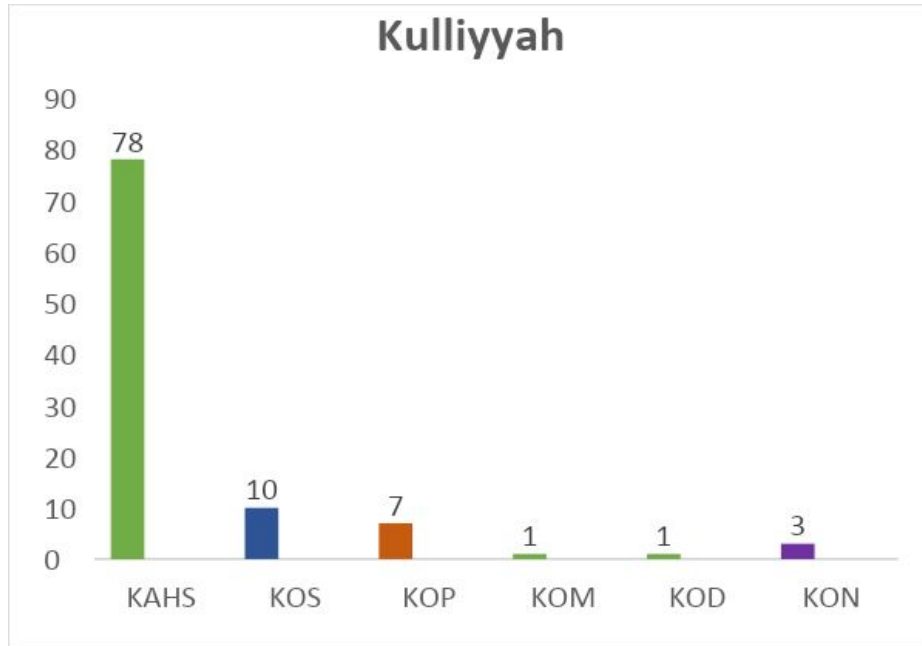


Figure I The percentage of subjects participated by kulliyyah

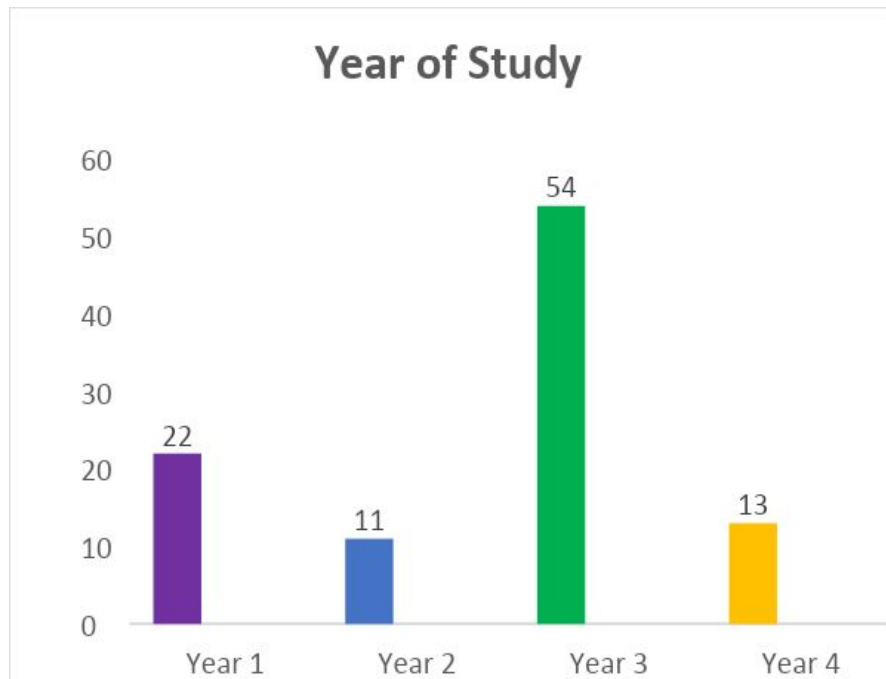


Figure II Year of Study

Prevalence of viewing food-based account followed on Instagram

The data shows that out of all account followed on Instagram, 0.64% of them are food-based, ranging from 0.1 to 30%. The lowest number of food-based account followed by subjects is one and the highest is 112 accounts. Thus, the null hypothesis is accepted as there was more than 10% of following food-based account followed by subjects.

Table II Number and percentage of following food-based accounts by subjects on Instagram

Characteristics	Median \pm IQR	Range
Number of food-based account followed, n	3.0 \pm 4.0	1 - 112
Percentage of following food-based account, %	0.644 \pm 0.9	0.1 - 30

Correlation between Following Food-Based Account on Social Media (Instagram) with Anthropometry Measurement

There is no significant correlation between following food-based account with BMI and body fat. It means that people who follows or subscribe to more food-based accounts not necessarily have higher BMI or body fat percentage.

Table III Correlation between percentages of following food-based account with BMI and body fat

Variable	Correlation coefficient, r	ρ -value
BMI (kg/m ²)	0.017	0.865
Body fat (%)	0.055	0.585

Influence of viewing food images on Instagram on sweetness perception

VAS 1 shows score of sweetness level without viewing while VAS 2 shows level of sweetness perceived after viewing food images. The higher the VAS score, the higher sweetness perception. Spearman's Rho correlation was conducted in order to test the main hypotheses and determine whether or not viewing Instagram food-based account affected their sweetness perception. The significant ρ -value is <0.001 which means that viewing visual food on Instagram and sweetness perception have statistically significant correlation. The sweetness perception increased when subjects view Instagram food-post rather than not viewing Instagram food- post.

Table IV Correlation between viewing visual food and non-viewing visual food on Instagram

Variable	Mean \pm SD	Correlation coefficient, r	p -value
VAS 1	3.8 \pm 1.8		
VAS 2	5.0 \pm 2.0	0.735	<0.001

DISCUSSION

It was observed that there were more than 10% of the total Instagram accounts followed by some of subjects were food-based Instagram account which is consistent with the previous study (Hu, 2002). Finding shows that there is no significant correlation between food-based Instagram account followed with BMI and body fat percentage. There is a potential that subject does not follow food-based account, but they can explore the food-images post on Instagram by searching #foodies or any other food's hash tag as it is the best tracking trends on Instagram that help people find the keywords on what they want to search. Overall, there are other factors that also influence the BMI and fat percentage whereas it is maybe not from frequently viewing the visual food on Instagram.

The significant amount of screen time brings concern in view of several studies that reveals the association of watching television and their health. Previous study done by Boulus et al. (2012) found that the number of hours of TV shows enjoyed is correlated with BMI and children who spent more than 120 minutes/day watching television at age six were less active and have higher body mass indices at ages eight and ten compared with children at age six watched less television (Hands et al., 2011). However, cross-sectional study of children and adolescent shows that in a population-based, television viewing and physical activity were not associated but eating meals while watching television was directly associated with adiposity.

It was also observed that there was a significant increase in the sweetness level when subjects view Instagram food-post rather than not viewing Instagram food-post. Hence, the main hypothesis of this study is accepted. The sweetness perceived may give potential effect while eating. To be concern, when people eat something that taste sweeter, it can create pleasure to subjects and exhibit tendency to overeat after viewing Instagram food-post (Jabr, 2016).

There could be several explanations to why sweetness perception associates with increase food intake. Lowe & Butryn (2007) found that foods especially fats and sweet can triggers brain chemical in a way that drive people to over consume as the brain responds by releasing large number of neurochemical dopamine that creates intense feeling of pleasure. The brain will be concentrated with large number of dopamine that eventually reduces its sensitivity. As a result, the brain of overeaters need more sugar

and fat to achieve the same threshold of pleasure as previously experienced with smaller amount of foods. This explains why overeater continues to eat as a way of recovering or keeping a sense of well-being. The similar study also suggested that in overweight individual, the brain cannot respond to this hormone dopamine well because of the increase amount of the fatty tissue in the body.

CONCLUSIONS

It is confirmed that the relationship between BMI and fat percentage with the percentage of food-based account followed on Instagram is not clear. However, the score on sweetness perception after viewing food-post on Instagram is higher which means that the subjects perceived the liquid taste sweeter. This has proved that there is a clear relationship between exposures to the food-based Instagram account followed on sweetness perception. The effect of the sweetness taste perceived could bring intense feeling of pleasure, hence lead to the excessive food intake. Thus, this drives excellent measures that should be taken when viewing food-post on Instagram as well as when concerning the obesity issues in the population.

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