Original Article

Eating breakfast and snacks while television viewing are associated with some cardio metabolic risk factors among Iranian children

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A B S T R A C T

Aim: We aimed to investigate the association of eating meals while television viewing (TVV) and screen-based behaviors with cardio metabolic risk factors (CRFs) among school-aged children in Shiraz.
Materials and methods: This cross-sectional study was done on 409 primary school children (217 boys), aged 6–9 years. Physical activity, time spent on screen-based behaviors and frequency of eating meals while TVV were measured using a questionnaire. Anthropometric indices, fasting blood sugar (FBS), blood lipids, blood pressure (BP), dietary intakes and physical activity were assessed. Association of eating while TVV with CRFs were assessed using linear regression, adjusted for potential confounders. All statistical analysis were conducted using the Stata 13 software.
Results: Fully adjusted model showed that TVV time had significant positive association with waist circumferences (WC), and BP (p < 0.05). Also, we found an inverse relationship between using Computer and Video games with TG level (β = −0.3; CI: −0.64, −0.09). Children who ate two or more breakfast meal while TVV had higher WC (β = 2.02; CI: 0.51, 3.53) and FBS (β = 3.58; CI: 0.39, 6.78) compared to who never ate breakfast while TVV. After adjustment for Screen time and BMI, eating snacks while TVV was positively associated with FBS and systolic BP. However, Eating dinner and lunch while TVV were not significantly associated with any of CRFs after adjustment for confounders.
Conclusions: We found that both eating breakfast and snacks while TVV were associated with WC, FBS and BP in children. Also, excessive TVV was associated with WC and BP.

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1. Introduction

Non-communicable diseases such as obesity and cardiovascular diseases are global public health problems and major causes of morbidity and disability in middle and large countries [1]. According to the World Health Organization (WHO) report, by the year 2020, non-communicable diseases are estimated to account 73% of all death in the world [2]. Cardiometabolic risk factors (CRFs) including abdominal obesity, hypertension, insulin resistance and dyslipidemia are highly prevalent in children and

adolescents in developing countries [3]. For example, it was estimated that 28% of Iranian children and adolescents had low high density lipoprotein cholesterol (HDL-c), 20.1% had hyper-triglyceridemia and 17% were overweight in 2006 [4]. CRFs and childhood obesity can increase the risk of type 2 diabetes and metabolic syndrome in later life [5,6]. Therefore, detection and management of CRFs at early ages may be an important strategy for prevention of more serious chronic diseases [7].

Different factors such as low physical activity and nutrition transition (changes of dietary pattern toward high consumption of saturated fat, refined carbohydrate, sugar and low consumption of dietary fiber) are partly associated with the increasing rate of CRFs [7,8]. Screen-based behaviors including electronic media (e g. Television (TV) viewing, computer use and video games) are the most common children's sedentary behaviors [9]. It has been reported that among the screen-based behaviors, TV viewing is highly prevalent in children and adolescents [10]. Recent evidence has approved that excessive TV viewing has adverse effects on pediatrics health [11,12]. This relationship is partly due to two main mechanisms first; TV viewing is a sedentary activity so

replacement of more active behaviors with TV viewing could lead to a decrease in energy expenditure, second; increase consumption of energy dense foods via 'mindless eating' which is likely to occur while TV viewing [13,14].

Some studies reported that eating meals while TV viewing was associated with unhealthy eating habits like reduced consumption of fruits and vegetables also increased consumption of soft drinks [15,16]. Moreover, several recent cross-sectional studies reported that eating meals while TV viewing was positively associated with overweight and obesity among children [17–19], while others had not [20].

2. Objectives

To the best of our knowledge, no study has assessed the relationship between eating meals while TV viewing and CRFs, so the aim of present study was to assess the association between eating behaviors while TV viewing with abdominal obesity, lipid profile, fasting blood sugar and blood pressure in primary school children in Shiraz.

3. Participants and methods

This cross-sectional study was conducted on 480 primary school children aged 6–9 years in Shiraz during 2016. Selection of participants was performed using a stratified multistage sampling method. Four schools were randomly selected from each educational district. Then in each school three classes and in each class 10 students were randomly selected. In the study 41 children (8.5%) were excluded because data on the variables of interest were missing, 19 children (3.9%) refused to participate in the study and 11 children (2.3%) had chronic disease. After excluding missing values and incomplete data, final sample size was 409 (response rate 85.2%). All procedures and aims of the study were explained to participants and their parents, then written consents were signed by them.

3.1. Socioeconomic status

Family Affluence Scale (FAS) was used to determine the economic status of participants' families. FAS is a valid questioner consisted of four questions as follow: "Do your family have car, van or truck?"(No [0] or yes one [1] or yes two [2]), "Does your child has separated bedroom for her/himself?" (No [0] or yes [1]), "During last year, how many times do your family go on a trip?" (None [0] or once [1] or twice [2] or more than twice [3]), "How many computers/laptops does your family own?" (None [0] or one [1] or two [2] or more than two [3]). After summing 4 numbers, families' economic status were classified as low (score < 2), medium (score 3–5) and high (score > 6) [21].

3.2. Screen time and physical activity

Total screen time is represented the daily hour of watching TV, playing video games and working with computer which was estimated using QAPACE (Quantification de L'Activite Physique en Altitude chez les Enfants) questionnaire adopted for Iranian children and adolescents [22]. Parents were asked "How many hours do your children spend on watching TV, Computer use or playing Video games and/or Smart phone and Tablet use per weekdays and weekends (separately)". With seven responses categories including; "Not at all", "Half an hour a day", "1 h a day", "2 h a day", "3 h a day", "4 h a day" and "5 h a day". Then daily hour of watching TV/video game and or computer use were calculated as follows: [(hours of TV/video game and or computer/Smartphone and Tablet on weekdays × weekdays frequency)+(hours of TV/

video game and or computer on weekend × weekend frequency)/ 7]. Also, Participants' physical activity were assessed using QAPACE questionnaire completed by parents.

3.3. Dietary intakes

The frequency of eating meals while TV viewing was assessed with three non-consecutive 24-h dietary records (including 2 weekdays and 1 weekend) and children's parents were asked to write down which of the meals and snacks were eaten in front of TV. Therefore possible responses for each meal included 0–3 times. Also, energy intake and nutrients were calculated using nutritionist 4 software.

3.4. Anthropometric measurements

Anthropometric measurements were done by trained researchers according to standard procedures. Height was measured without shoes to the nearest 0.1 cm using portable stadiometer. Waist circumference (WC) was measured using a non-stretchable tape with 0.1 cm accuracy at the midpoint between the top of the iliac crest and lower rib after gentle exhalation. Weight was measured to the nearest 0.1 kg using Digital Body Composition Monitor BF511 (OMRON-China) in light clothing. The measurements were taken twice and average values were recorded. Body Mass Index (BMI) was calculated as weight (kg) divided by height (m^2) squared and BMI categories was classified according to age and gender specific WHO standards [23].

3.5. Blood pressure

Blood pressure (BP) was measured using mercury sphygmomanometer (ALPK2, Japan) with a stethoscope and suitable cuff size for children. BP measurements were taken after 10 min rest in sitting position with right arm positioned at the heart level and feet on the floor. Two measurements were done with at least 5 min interval and the average of 2 values was recorded.

3.6. Biochemical analysis

After an overnight fast, venous blood samples (5 ml) were taken. Serums were separated by centrifuging (15 min, 1500 G) the blood samples and stored at −80C for further analysis. Fasting blood sugar (FBS) and lipids (Triglyceride (TG), Low density lipoprotein (LDL-c) and High density lipoprotein (HDL-c)) were measured using enzymatic colorimetric methods by B T1500 Autoanalyzer and Pars Azmon kits (Tehran, Iran).

3.7. Statistical analysis

Kolmogorov-Smirnov test was conducted to examine the normality of variables. Multiple linear regression analysis was performed to identify the independent association between different type of screen time activities and eating meals while TV viewing with CRFs. Differences between genders were tested with independent samples t-test and chi-square for quantitative and qualitative variables respectively. There were not any significant interaction between gender and screen time components and eating meals while TV viewing. Therefore, all analysis were performed on boys and girls together. The regression analysis were adjusted for gender, mother's education, socioeconomic status (SES), physical activity, BMI (excepted for WC), some of macro and micronutrients. All statistical analysis were done using STATA software version 13.0 (StataCorp, Texas, USA). A P value lower than 0.05 was considered significant.