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Review

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Impacts of Lifestyle and Socioeconomic Status on Childhood Obesity

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ABSTRACT

Childhood obesity is an important indicator to predict adulthood obesity, so monitoring factors that contribute to childhood obesity plays a constructive role in preventing adulthood chronic diseases and metabolic syndrome. The present article attempted to analyze the impacts of lifestyle, sedentary activities, dietary habits and socioeconomic status on childhood obesity, and to provide recommendations for preventing childhood obesity. Research findings showed that childhood obesity results from increasing sedentary time, unhealthy eating behaviors and changes of healthy environment. TV viewing is the most common sedentary activity that children engage in. Although the causal relationship between TV and physical inactivity to obesity is not significant, sedentary lifestyle with long-term TV viewing has potential impact on childhood obesity. Therefore, daily TV viewing should be limited in 2 hours. Additionally, both unhealthy eating behaviors accompany TV viewing and the foods ads on TV are found to result in excess energy intake in children, and serve as critical connecting factors between TV viewing and childhood obesity. Family income and educational background of parents are also healthy indicators of children. Furnishing TV sets in bedroom, dining room or kitchen not only increases TV viewing but also worsens dietary habit. Therefore, increasing physical activity, controlling TV viewing time, carefully selecting TV programs and building healthy environment are effective strategies to prevent childhood obesity.

KEYWORDS: Television viewing; Sedentary activity; Dietary habits; Socioeconomic status.

INTRODUCTION

Since 1980s, Taiwan and many countries were facing the problem of growing prevalence of obesity in children.[1] Yoon et al[2] conducted an obesity epidemic survey of Asian countries, and found that obesity in children has reached epidemic levels. World Health Organization (WHO)[3] has repeatedly warned that the problems of overweight and obesity become more and more severe, and it's almost a global epidemic.

According to the definition of overweight and obesity from International Obesity Task Force (IOTF), the prevalence of obesity among school children aged 6-18 in Taiwan has increased significantly. The prevalence of overweight or obesity in male students rose from 19.6% to 25.3%, while rose from 13.8% to 18.4% in female students.[4] Taiwan Ministry of Education reported the health status of students aged 6-12, showing the percentage of overweight was 14.9% (male 15.85%, female 14.02%), and obese was 10.3% (male 10.92%, female 9.73%). People who were obese during childhood are likely to be also obese when becoming adults. The chance stands more than 50%, and it's five-fold to people who were normal-weight during childhood.[5] The obesity-induced chronic diseases in adults not only cause countless medical expenses in the nation, but also influence the quality of life in individuals. Therefore, while the prevalence of children obesity has been continuously rising, how to control possible factors becomes an important issue.

The benefits of physical activity have been confirmed in many studies in the past.[6]

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However, the proportion of regular exercisers remains relatively low. If taking physical activity recommendations from Centers for Disease Control and Prevention (CDC) and American College of Sports Medicine (ACSM), that is "five to seven days per week, and more than 30 minutes of moderate physical activity per session", there were only 32% adults meeting the recommendations.[7] According to the survey of Bureau of Health Promotion, Department of Health[8] in Taiwan, there were 57% people claimed engaging in physical activity, with male 58.4% and female 55.5% respectively. However, the percentage of those who meet the criteria of regular exerciser was apparently low as 24.82%.

Physical inactivity might result from low engagement or high dropout. Previous studies had explored many exercise barriers, such as feeling irrelevant to exercise, no necessity for active living, negative perception to exercise, avoiding dangerousness or tiredness, lack of time or facilities, without companions, and so on.[9] On the other hand, high dropout also plays a critical role in physical inactivity. Previous research revealed that more than 50% participants would drop out from exercise program within 6 months.[10,11] Influencing factors includes childhood exercise habit, and psychological, physical, social and situational contexts.[12]

Health beneficence of exercise is well known from previous studies. However, the proportion of regular exercisers in Taiwan remains low. Despite low engagement or high dropout, exercise behavior involves multiple factors from physiological, psychological, and social perspectives. Furthermore, previous studies suggested that exercise habits in adulthood are often established from childhood. In other words, childhood is the critical phase influencing the development of exercise behavior in the future. Hence, the present article attempted to analyze daily lifestyle in Taiwan children, and to explore possible strategies to prevent childhood obesity.

TAIWAN CHILDREN'S LIFESTYLE

Free time after school or on the weekends contribute major active time in children.[13] Study had shown significant negative relationship between sedentary time after school and physical activity. So, the physical activity conducted after school would determine if physical activity is enough for the whole day. The survey showed that the most common activities children engaged in after school were technological sedentary activities, such as TV viewing, PC games, and video games, and doing homework, while active activities included exercise and playing games.[14,15] In recent years, family structure gradually changed. Under the influence of double income families, single parent families and academic-oriented social context, some children go to various kinds of secondary schools or child care program after school or on weekends. Academic pressure in children is less than junior high school students. However, because elementary students are younger, and some of them only have half-day course, parents from double income or single parent families often worry about their children's safety and homework after school. Many child care programs provide pick-up service so that it's quite popular to send children to child care program after school. A survey in 2005 investigated the sedentary activities and daily behaviors in 3-12 years Taiwan children, and found that 6-11 years children spent time watching TV, using computer, reading and going to cram school for 3.5 hours on weekdays and 6 hours on holidays.[16] In the survey, only cram school and artistic classes were calculated in the "secondary school" category. If time spent in child care program had been also calculated, the total sedentary activity time would increase a lot. Therefore, whether participating in child care program after school causes decrease in active time should be further investigated in the future.

CHILDREN'S SEDENTARY ACTIVITIES

Children spent most of their time sitting and listening to the lectures in school, going to secondary school after school, and watching TV, reading, and playing video games at home.[14] Chang et al. investigated the sedentary activities in 3-12 year children, and found that the children aged 6-11 year spent their time on TV viewing, computer using, and reading in weekdays for 1.8 hrs, 0.4 hrs, 0.6 hrs, 3.4 hrs; and in weekends for 3.4 hrs, 1.2 hrs, 0.8 hrs, and 0.6 hrs respectively.[16] But it should be noticed that the child care program was excluded from calculation, so the average time spent in secondary school might be underestimated. If average sleeping time per day in weekdays is 8 hours, school aged children spend at least 2/3 time sitting or lying. I indicated that the major lifestyle of 6-11 year Taiwan children tends to be sedentary activities.

Research indicates that children spend more time doing sedentary activities. Take TV viewing, computer using, video games playing, and reading as observed variables, it was found that the body mass index (BMI) of children who spend more time in sedentary activities was higher than their counterpart.[17-19] The most representative sedentary activity is TV viewing.

As to the perspective of TV viewing, research investigated the dose-response relationship between TV viewing time and children obesity.[20] They found when TV viewing time extended one more hour, the prevalence of obesity increased 2%. Whether TV viewing substitutes other active activities and results in physical activity decreasing and children obesity is still debatable. Amount of TV viewing and physical activity related to obesity and metabolic risks respectively, while there was no significant correlation between TV viewing and physical activity.[17] Scientists reviewed previous studies, and found TV viewing gradually occupied time of active activities.[21] As to recommendation in TV viewing, research suggested 2 hours as an indicator to predict unhealthy dietary habit and physical inactivity. Because the time spent on TV view would overlap the time spent on physical activity, "Healthy People 2010" set the physical activity goal of children and adolescents as "more than 75% children and adolescents watch TV less than 2 hours in a day". While in the survey conducted in Taiwan in 2001 and 2005, there were 20-30% children who watched TV more than

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2 hours in a day, and the percentage increased to 60-70% on holidays. According to the recommendations in the USA, 20-30% children in Taiwan were classified as low physical activity level, and the percentage almost corresponded to children obesity prevalence. Hence, TV view seems to be an independent indicator to predict children obesity.[22]

As to the perspective of computer using and video game playing, the risk of being overweight increases as the time spent on computer using extends. Research indicated that TV viewing and video games are risk factors of overweight and obesity in 7-11 year school-aged children.[18] There's a significant linear relationship between the time of video games playing and BMI. Children with higher BMI spent general time playing video games, while children with lower BMI spent more or less time playing video games.[19] It was suggested that if children play video games longer, the healthy dietary behavior might be influenced, and then resulted in lower BMI.

CHILDREN'S DIETARY HABITS

Over the past 30 years, the prevalence of children obesity continuously increases. Research suggested it may be due to the westernization of dietary habit.[23] National Health Interview Survey in 2001 reported that 50% children snacked more than twice, 70% children consumed soft drinks more than once, and 30% children ate fast food more than once per week. In 2009, Taiwan Cancer Foundation conducted a survey of "eating habits of two generations". Results indicated that when children decided what to eat outside, the sequence of their choice was instant noodles (>80%), fried salty chicken, and soya-mixed meat. It meant children preferred high-calorie and heavy tasty foods.

Because the concept of "healthy school" had been advocated in recent years, grocery stores on campus were prohibited to sell high-calorie or high-sugar foods and beverages. In order to prevent children from eating high-calorie foods during recesses, some primary school even terminated the food contract with grocery store on campus. However, beverage chain stores, convenient stores, and vendors surrounding campus are so convenient that children can get foods or drinks quite easily after school or cram school. Excess energy intake possibly results from doing sedentary activities and drinking or eating at the same time. Ekelund et al suggested that high-calorie dietary behavior during inactive period might link the relationship between sedentary activity and obesity.[17] Therefore, further investigation is needed to examine if dietary behavior accompanying sedentary activity after school increases the prevalence of Taiwan children obesity.

TV viewing not only prevents children from doing activities, but also encourages children consume too much high-fat and high-calorie foods while watching TV.[22] Excess energy intake might be the major reason causing children gain weight. Wiecha et al found that each additional hour of television viewing would increase energy intake by 167 kcal per day.[24] A study explored 9-10 year children's self-report of TV viewing behavior, and found that the frequency of watching accompanying eating is positively related to obesity. In other words, TV viewing accompanying unhealthy dietary habits might be the linking factor between TV viewing and children obesity.[17]

Research indicated that the dietary style during TV viewing tends to be high-calorie and high-carbohydrate foods. Matheson et al claimed that although the amount of food consumed during TV viewing was not significantly correlated to BMI.[25] However, 3rd graders consumed more high-calorie foods and fewer vegetables than 5th graders so that there was a significant different relationship between the two groups. So, dietary education in lower-grade elementary students should be more addressed when promoting the concept of healthy diet. Mattes indicated that the increases of TV viewing time indirectly increase the opportunity of drinking sugar-sweetened beverages in children.[26] Because sugar-sweetened drinks contain more obesigenic genes, drinking sugar-sweetened beverages while watching TV might be the linking factor between TV viewing and children obesity.

Besides, children are under great exposure of unhealthy dietary information from TV programs or ads.[21] This information would influence the choice of foods. Major proportion of food ads during the most popular sessions were sugar-sweetened beverages and fast foods.[27] Research showed that food ads not only evoke children's purchasing desire, but also enhance children's drive to ask parents on buying.[28] In addition, research also proved that 9-11 year children ate more snacks after watching food-related ads than non food-related ads.[29]

FAMILY SOCIOECONOMIC STATUS

Due to economic and scientific development, many families own more than one TV set. According to the survey, almost every family has four TV sets in average. Specifically, 63% children's rooms furnished TV set, while 46% kitchen or dining rooms furnished TV set.[30] Furnishing TV sets in rooms would enhance the convenience of TV viewing. So, research found that children having TV set in their rooms watched more TV for 4.8 hours per week than their counterpart, and the relative odd rates of overweight was 1.31. Therefore, whether furnishing TV in room is a strong predictive indicator of children overweight or obesity.[31] If TV set is furnished in kitchen or dining rooms, the chance of consuming nutritional and vegetables filled with fibers was low. Because when children ate meals and watched TV at the same time, their food choices would tend to be pizza, snacks, or soft drinks.[32] In short, furnishing TV set in room, dining room or kitchen not only increases TV viewing, but also creates an unfavorable environment for balanced nutrition intake.

Family income and educational background of parents represent the capacity that family can afford for the cost of children's expense and providing healthy living environ-

ment. Therefore, family income and educational background of parents serve as family-socioeconomic indicator to assess children's health.[33-35] Research indicated that the time spent on TV viewing and video games of the children in lower parental educational background families were much more than their counterpart.[35,36] It implied that families with higher income or higher educational background of parents were supposed to provide better health management strategies for their children.

CONCLUSION

Children obesity is the product of the interaction between genetic and environmental factors. Genetic factors determine the susceptibility of gaining weight on the individuals. Because genetic factors could not be changed considerably great in few decades, the fact that the prevalence of children obesity increased rapidly in the past 30 years revealed the significance of environmental factors. Environmental changes made children fail to strike the balance between energy intake and expenditure, so it provided a condition for increasing the prevalence of obesity. Because of advances in technology, TV, computers and video games become popular in daily life, and increases children's sedentary time. Besides, dietary style has been westernized, and become more delicate, so that high-sugar and high-calorie foods, such as cake, hamburger, French fries, milk tea, coke, and so on replaced traditional foods. Sedentary activities increases, physical inactivity, and unhealthy dietary behavior are all reasons induce children obesity. As long as these negative behaviors are modified, the prevention of children obesity can be enhanced.

CONFLICTS OF INTEREST: None.

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