

Co-occurrence of Screen Time and Eating Behaviors among Young Children Aged 5 to 9 Years

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ABSTRACT

Background: High screen time, high energy dense food and low fruits and vegetables are important risk factors among children. The study aimed to find out co-occurrence of screen-time and unhealthy eating behavior among young children aged 5 to 9 years in Pokhara Metropolitan.

Methods: A cross-sectional study was conducted among children. Face to face interviews were done with 352 parents of the selected children. The study was conducted from March to October, 2020. High screen time was defined as >2 hours screen viewing each day; low fruit vegetable defined as <3 servings a day; and \geq one serving a day of energy dense food was categorized as high consumption.

Results: Out of total, 33.0% did not meet recommendation for single health behavior, 38.9% did not meet for two and 23.9% did not for three health behaviors; and 62.8% had two or more risk behaviors. Of total, 19.6% had low fruit vegetable and high energy dense intake, 17.0% had high screen time and low fruit vegetable, 2.3% high screen time and high energy dense and 23.9% had high screen time, high energy dense and low fruit vegetable. Proportion of co-occurrence of multiple risk behaviors was higher among those whose parents had higher screen time, offered screen devices to them; and the children who had television and television cable at home, and had personal screen device ($P<0.05$).

Conclusions: About two-third children had multiple risk behaviors; proportion is higher among those who had access to screen devices and higher parental screen time. It may require a combination of efforts to improve healthy behaviors.

Keywords: Children; co-occurrence; energy dense food intake; fruit vegetables intake; screen time.

INTRODUCTION

Screen time (ST) refers to the time that a child spent watching television, playing video games, using other apps on a mobile device on a usual school day and weekend day.¹ ST should not be >2 hours for children.² Recommended fruits and vegetables consumption is two and three servings per day.³ High ST, high energy dense (ED) food and low fruits vegetables (FV) are important risk factors for many NCDs and there is clustering of unhealthy behaviors among children.⁴⁻⁷ Early childhood is the most important stages to initiate healthy life styles to prevent of NCDs.⁴ Children aged 5 to 9 years are least considered for study of unhealthy behaviors and their co-occurrence in Nepal.⁸⁻⁹ Understanding of clustering of

unhealthy behaviors will provide evidences for effective programs. The study aimed to assess prevalence of co-occurrence of ST and eating behaviors, and association with socio-environmental factors among children aged 5 to 9 years in Pokhara Metropolitan.

METHODS

The study was a part of the study, "Prevalence and Correlates of Screen Time, Eating Behavior and Co-occurring of Screen-Time and Unhealthy Eating Behavior among Young Children in Pokhara Metropolitan" conducted from March to October 2020 which was funded by Nepal Health Research Council (NHRC) as a

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provincial grant. A cross sectional analysis was done to assess the pattern of co-occurrence of ST and unhealthy eating among children aged 5 to 9 years in the study.

Sample size was calculated using the following formula recommended for prevalence study¹⁰ where value of Z at confidence interval 95% ($Z = 1.96$; $P = \text{prevalence}$ ($p = 0.70$; prevalence of television watching >2 hours¹¹; $d = \text{precision}$ ($d = 0.05$). Therefore, sample size was 322 which became 354 after addition of 10% non-response rate. A total of 352 samples were analyzed for the study after deleting incomplete data. A multistage random sampling design was applied. Three wards (1, 4 and 27) were randomly selected from 33 wards of Pokhara metropolitan at first stage. List of the schools with primary classes was prepared for each ward. At second stage, one public and one private school were chosen randomly in each ward. Students of grade one to four were selected proportionately from each school. A list of students was prepared and their parents were requested for participation.

Trained enumerators visited parents of the selected children at their homes and conducted face to face interviews with them. Parents were asked to report the time (in hours and minutes) that their child spent watching television, playing video games, watching video/TV shows and/or using other apps on a mobile device on a usual school day and week end day.^{1,3,12} Parental ST was also measured using the similar sheet. Mean duration was derived from summing the time of 6 school days and 1 weekend day. Then, children were classified into high or low ST groups based on guidelines of ≤ 2 hours screen viewing as standard.² ST used for homework and academic purpose was excluded from the total ST in the study.

Regarding FV consumption, parents reported the frequency that their child consumed fruits and vegetables items and energy dense snack items during a usual week as it was done in previous study.³ Three serving of vegetables, two servings of fruits and five servings of FV are recommended good practice.¹³ However, at least two servings of vegetables, one serving of fruits and 3 servings of FV were used as cut off values in the study as very few children met the aforementioned standards which was also supported by previous literatures that large gap existed between the recommended and actual intake.¹⁴⁻¹⁵ Fruit intake was dichotomized to define low as $\leq 5-6$ days per week.¹⁵ Vegetable intake was dichotomized on the basis of two serving a day, and low FV was defined as <3 servings a day. One or more serving/s a day was categorized as

high intake of ED.

Co-occurring ST and food behaviors was grouped as: (1) One or no risk behavior; (2) Low FV/ High ED; (3) High ST /Low FV; (4) High ST/High ED; (5) Three risk behaviors; based on the reference from a previous study.³ These categories were again grouped into three groups as (1) One or no risk behaviors; (2) Two risk behavior of any type; (3) Three risk behaviors.

Socio-demographic information included age, sex, school type, grade, sibling; family type and residence. Number of televisions and smart phones, access to internet and TV cable, food at school and after school food were environmental factors. Variables related to parental behaviors included ST of parents and offering screen devices to children.

A semi-structured questionnaire was developed based on previous guidelines and standard questionnaires.^{1,3,12} The questionnaire was translated in Nepali language and pretested in similar population. Adequate training was provided to the enumerators. Face to face interview was conducted among one of the parents of children.

Statistical package for the social sciences (SPSS) version 20 was used. Ratio of observed to expected prevalence was computed to assess the clustering of two or more behaviors as done previously.¹⁶ The expected prevalence was computed as the proportion of children not meeting a specific guideline multiplied by the proportion of children that met the guidelines for the remaining behaviors. Chi square test was applied to assess the association between each independent variable and number of risk behaviors present at 5% level of significance.

Ethical approval was taken from Nepal Health Research Council (Number: 63/2020P). Written informed consent was taken from each respondent.

RESULTS

Table 1 shows the general characteristics of study population. Of total, 79.5% respondents were mothers of the children; and 41.8% had basic education. Of total study population, 54.0% children were boys; 35.2% were at age of 9 years; 31.3% were from grade one; 64.1% were from private schools; 65.3% children were in nuclear family. Of total, 67.6% children had at least one TV and 93.2% had smart phone at home; 46.3% had internet connection and 71.6% had cable TV connections at home and 11.6% children had their own personal gadgets.

Table 1. Socio-demographic characteristics and environmental factors at home.

Variables	Options	Number	Percent (%)
Socio-demographic			
Respondents	Fathers	72	20.5
	Mothers	280	79.5
Education of parents	Illiterate	33	9.4
	Basic (up to 8)	147	41.8
	Secondary (9 to 12)	140	39.8
	Higher	32	9.1
Sex of the children	Male	190	54.0
	Female	162	46.0
Age group (in years)	5	22	6.3
	6	60	17.0
	7	65	18.5
	8	81	23.0
	9	124	35.2
Grade	One	110	31.3
	Two	89	25.3
	Three	80	22.7
	Four	73	20.7
Type of school	Public	127	35.9
	Private	227	64.1
Family type	Nuclear	230	65.3
	Joint/extended	122	34.7
Living with sibling	Yes	267	75.9
	No	85	24.1
Type of resident	Own house	205	58.2
	Rented house	147	41.8
Environmental			
No. of TV	0	78	22.2
	1	238	67.6
	2	36	10.2
No. of smart phones	0	24	6.8
	1	115	32.7
	≥2	213	60.6
Internet at home	Yes	163	46.3
	No	189	53.7
TV cable at home	Yes	252	71.6
	No	100	28.4
Having personal gadget of child	Yes	41	11.6
	No	311	88.4
Food at school	Home-made	121	34.4
	Buying from shop	125	35.5
	Provided by School	106	30.1
After school food	Home-made	262	74.4
	Bought from outside	90	25.6

Of total, 49.4% parents had ST >2 hours a day; 40.3%

parents ever offered screen devices to children to keep them at home; 14.8% offered to make them eat and 25.3% ever offered ST to have leisure for them. Of total, 47.4% children had ST >2 hours a day; 86.9% reported FV intake <3 servings a day and 48.3% had ED intake ≥1 serving a day. Regarding co-occurrence, 4.3% has no risk behavior, 33.0% had single risk behavior, 38.9% had two and 23.9% had three risk behaviors. Of total, 19.6% had low FV and high ED; 17.0% had high ST and low FV, 2.3% high ST and high ED; and 23.9% had high ST, low FV and high ED. Overall, 62.8% children did not meet recommendations for two or more health risk behavior (Table 2).

Table 2. Behaviors related to screen time and food habits.

Variables	Options	Number	Percent (%)
Parental behaviors			
	Parental ST >2 hours a day	174	49.4
	Offering screen to keep child at home	142	40.3
	Offering screen to make child eat	52	14.8
	Offering screen to have free time	89	25.3
Children behavior			
	Total screen time >2 hours a day	167	47.4
	Fruits intake < 1 serving a day	280	79.5
	Vegetable intake <2 servings a day	185	52.6
	FV intake <3 servings a day	306	86.9
	ED intake ≥1 serving a day	170	48.3
No. of risk behaviors	None	15	4.3
	One	116	33.0
	Two	137	38.9
	Three	84	23.9
Type of risk behaviors	None or one risk behavior	131	37.2
	Low FV and high ED	69	19.6
	High ST and Low FV	60	17.0
	High ST and high ED	8	2.3
	High ST, high ED and low FV	84	23.9
≥2 risk behaviors	No	131	37.2
	Yes	221	62.8

Table 3 shows clustering of risk behaviors. Of total, 4.3% meet recommendations for all three health behaviors, 33.0% did not meet recommendation for single health behavior, 38.9% did not meet for two behaviors and 23.9% did not for all three behaviors. The ratios of observed and expected >1 indicated the clustering of risk behaviors.

Table 3. Prevalence of health risk behaviors.

No. of risk behaviors	High ST	Low FV	High ED	O (%)	E (%)	O/E ratio
3	+	+	+	23.9	19.89	1.20
	+	+	-	17.0	21.29	0.79
2	+	-	+	2.3	2.99	0.76
	-	+	+	19.6	22.07	0.88
	+	-	-	4.3	3.21	1.33
1	-	+	-	26.1	23.63	1.10
	-	-	+	2.6	3.32	0.78
0	-	-	-	4.3	3.56	1.20

+ denotes present and - denotes absent, O=observed, E =Expected

Table 4 shows association between co-occurrence of risk behaviors and socio-demographic variables. The study showed no significant association of number of risk behaviors with most of the socio-demographic variables except type of residence.

Table 4. Association between number of risk behaviors and socio-demographic variables.

Variables	Number of risk behavior/s			Chi-square value	P value
	No or single	Two	Three		
Sex					
Male	69 (36.3)	72 (37.9)	49 (25.8)	0.843	0.656
Female	62 (38.3)	65 (40.1)	35 (21.6)		
Age (in years)					
5	7 (31.8)	11 (50.0)	4 (18.2)	5.171	0.739
6	26 (43.3)	20 (33.3)	14 (23.3)		
7	20 (30.8)	31 (47.7)	14(21.5)		
8	30 (37.0)	29 (35.8)	22 (27.2)		
9	48 (38.7)	46 (37.1)	30 (24.2)		
Type of school					
Public	48 (38.1)	48 (38.1)	30 (23.8)	0.075	0.96
Private	83 (36.7)	89 (39.4)	54 (23.9)		
Type of family					
Nuclear	94 (40.9)	82(35.7)	54 (23.5)	4.243	0.120
Others	37 (30.3)	55 (45.1)	30(24.6)		
Parents Education					
Illiterate	11 (33.3)	14 (42.4)	8 (24.2)	0.895	0.925
Basic	54 (36.7)	60 (40.8)	33 (22.4)		
Secondary and above	66 (38.4)	63 (36.6)	43 (25.0)		
Living with sibling					
Yes	106 (39.7)	99 (37.1)	62 (23.2)	2.989	0.224
No	25 (29.4)	38 (44.7)	22 (25.9)		
Type of resident					
Own	71 (34.6)	91(44.4)	43 (21.0)	6.368	0.041
Rented	60 (40.8)	46 (31.3)	41 (27.9)		

Having TV cable at home, having personal gadgets of children, number of TV, offering screen devices to make children eat, offering screen devices to have free time and offering screen devices to keep children at home, parental ST and after school food type had significant association with the number of risk behaviors (p <0.05) (Table 5).

Table 5. Association between co-occurrence of risk behaviors and environmental variables.

Variables	Number of risk behavior/s			Chi-square value	P value
	No or single	Two	Three		
No. of TV at home					
0	46 (59.0)	30 (38.5)	2 (2.6)	33.523	<0.001
1	71 (29.8)	93 (39.1)	74 (31.1)		
≥2	14 (38.9)	14 (38.9)	8 (22.2)		
Cable at home					
Yes	72 (28.6)	103 (40.9)	77 (30.6)	35.326	<0.001
No	59 (59.0)	34 (34.0)	7 (7.0)		
Having personal gadgets					
Yes	10 (24.4)	13 (31.7)	18 (43.9)	10.480	0.005
No	121 (38.9)	124 (39.9)	66 (21.2)		
No. of smart phones					
0	12 (50.0)	8 (33.3)	4 (16.7)	4.317	0.365
1	48 (41.7)	40 (34.8)	27 (23.5)		
≥2	71 (33.3)	89(41.8)	53 (24.9)		
Parental offering of screen					
To keep child at home					
No	92 (43.8)	85 (40.5)	33 (15.7)	20.892	<0.001
Yes	39 (27.5)	52 (36.6)	51 (35.9)		
To make children eat					
No	117 (39.0)	120 (40.0)	63 (21.0)	9.323	0.009
yes	14 (26.9)	17 (32.7)	21 (40.4)		
To have free time					
No	112 (42.6)	103 (39.2)	48 (18.3)	21.806	<0.001
Yes	19 (21.3)	34 (38.2)	36 (40.4)		
Parental screen time					
≤ 2hours	82 (46.1)	69 (38.8)	27 (15.2)	18.99	<0.001
>2 hours	49 (28.2)	68 (39.1)	57 (32.8)		
Food at school					
Home-made	56 (46.3)	41 (33.9)	24 (19.8)	8.670	0.070
Buying outside	37 (29.6)	51(40.8)	37 (29.6)		
Provided by school	38 (35.8)	45 (42.5)	23(21.7)		
After school food					
Home-cooked	110 (42.0)	100 (38.2)	52(19.8)	14.056	0.007
Bought food	21 (23.3)	37 (41.1)	32 (35.6)		

DISCUSSION

The study revealed that about two-fifth, 38.9% had two risk behaviors and one-fourth 23.9% had three risk behaviors of interest of the study. Lower than this study, approximately 25% of children aged 5 to 6 years had two or three health risk behaviors.¹⁶ However, another study among adolescents aged 11 to 12 years found about 70% had two or three health risk behaviors.³ Findings from a longitudinal study suggest that sedentary behaviors, when joined with unhealthy dietary habits, create a significant risk for obesity in early childhood.⁶ There is the evidences of clustering of multiple risk behavior as it was found in previous studies.¹⁶⁻¹⁸

In the study, socio-demographic variables except residence type showed insignificant association with number of risk behaviors which was unlikely than a previous study.^{17,18} Parental digital behavior and availability of screen media were significantly related with number of risk behaviors among children. Proportion of co-occurrence of multiple risk behaviors was higher among the children whose parents' ST was higher than the recommended limit and among them whose parents offered electronic devices/ST to make the children eat or to have leisure time or to keep children at home. As the ST of parents was found associated with child ST, it highlights the need for joint interventions targeting both parents and children.¹⁹ In the same way, proportion of presenting multiple risk behaviors was also higher among the children who had TV and TV cable at home, and who had their own personal electronic gadget. It is also evident that presence of multiple risk behaviors was found lower among the children whose parents provided home-cooked food to their children after school. This shows parental behaviors and family environment influence the health behaviors of children. A study recommended that parental support behaviors for physical activity, healthy eating and ST help children meeting established health guidelines/behaviors.²⁰ In addition, another study concluded that co-occurrence of multiple health behaviors occurs on the family level, thus focusing the family as a whole could increase effectivity of intervention programs.²¹ These shows that home environment and parental behavior are important to promote healthy behaviors among children. Therefore, it is very essential to formulate policies and strategies to address multiple risk behaviors among children.

The study has some limitations. About 40% samples were collected during COVID-19 pandemic which might have increased their screen time. As the schools were closed, some sampled children living in the rented room had already left the room. Those samples were replaced

with others children which might have limited the generalizability.

CONCLUSIONS

Nearly two-third of the children did not meet the recommendations for two or more health behaviors and there was evidence of clustering of ST and unhealthy eating behaviors. Proportion of co-occurrence of multiple health risk behaviors was higher among the children whose parents' ST was higher than the recommended, whose parents offered screen devices to them, and whose parents did not provide cooked food after school; and among the children who had TV and TV cable at home, and who had their own personal gadget. The study shows co-occurrence of health risk behaviors. Integrated strategies and interventions with participation of children, family, school and community may help to address multiple risk behaviors.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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