Prevalence and factors influencing physical activity among secondary school adolescents: A cross-sectional study

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ABSTRACT

Introduction: Physical inactivity is a major health concern among adolescents and is an independent, modifiable risk factor for several non-communicable diseases. Despite the World Health Organization recommended physical activity levels, many adolescents do not meet these guidelines. This study was conducted among secondary school students in Palpa district of Nepal to assess their physical activity levels and associated factors. **Methods:** A modified version of the Physical Activity Questionnaire Adolescents was used to collect data from 506 grade eight and nine students from six schools in Palpa district. **Results**: The results revealed that only 25.31% of students engaged in physical activity quite often or always, and only 23.10% met the daily WHO recommendation of at least 60 minutes of physical activity per day. Additionally, females were less likely to achieve the recommended physical activity level compared with males. **Conclusions**: The low levels of physical activity among secondary school students in Palpa district of Nepal highlight the need for interventions to promote physical activity. This study identified several factors associated with low physical activity levels, including limited break time at school, lack of parks or playgrounds near homes, and gender differences.

Keywords: Adolescents, Nepal, physical activity, risk factors, school children, sedentary lifestyle.

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INTRODUCTION

The prevalence of physical inactivity among adolescents is a growing concern worldwide. Physical inactivity is an independent, modifiable risk factor for several non-communicable diseases such as cardiovascular disease, ischemic stroke, type 2 diabetes, colon cancer, and breast cancer.[1] Higher levels of physical activity are associated with better health-related quality of life.[2] Physical activity can occur in various domains and is influenced by a complex network of factors.[3] The prevalence of low physical activity among adolescents is high, with higher odds among females.[4,5] Several different factors are associated with low physical activity levels among adolescents, including non-working mothers, time constraints, exercise only when having ample time, and stretching before exercise.[6] Participating in more physical education classes may be an effective approach to increasing physical activity levels among adolescents in low- and middle-income countries.[7] Despite the World Health Organization recommendation of at least 150 to 300 minutes per week and 60 minutes of moderate to vigorous-intensity physical activity per day for adults and adolescents respectively, a significant proportion of adolescents fails to meet these guidelines.[8]

This trend is particularly true for adolescents, who are often engaged in sedentary activities such as cell phone use and watching television.[9]

Nepal is not an exception to this trend, and there are few studies on the physical activity levels among Nepalese adolescents.[4,10–16] The issue is particularly relevant in the hilly regions where the lack of open spaces and the presence of household chores limit outdoor activities. Therefore, further evidence about the factors influencing physical activity in Nepal is needed to develop effective interventions to improve adolescent physical activity levels.

The research gap in this study is the lack of information on physical activity levels among Nepalese adolescents, particularly in the hilly regions of the country where outdoor activities are limited. The rationale for conducting this study is to address this gap and identify the factors associated with low physical activity levels among secondary school students in Palpa district of Nepal. The study aimed to provide evidence to develop effective interventions that promote physical activity among adolescents in the region, ultimately improving their health outcomes. To achieve this objective, a cross-sectional study was conducted among secondary school students in Palpa district of Nepal to assess their physical activity levels and associated factors.

METHODS

A cross-sectional study was conducted among secondary school students in Palpa district, located in Lumbini Province of Nepal. The district consists of two urban municipalities and eight rural municipalities. The data were collected from January 7 to March 7, 2023.

To calculate the sample size, the formula; $n = z^2 (p \times q) / e^2$, where: z = 1.96 (95%CI), p = 0.4, q = 1 - p = 0.6, e = 0.05 (margin of error) was used. The allowable error was set at 5% to ensure accurate data and reduce bias. So, substituting the values, we got: $n = (1.96)^2 (0.4 \times 0.6) / (0.05)^2$, n = 385. After adding 10% non-respondents, the final minimum sample size was 424. The study employed a random sampling technique across six schools, three from each urban and rural municipality, with participants selected from either grade eight or nine. Choosing a random sampling technique in this study was necessary to ensure that the sample was representative of the population from which it was drawn. In other words, the use of the random sampling technique minimized selection bias. The random sampling technique ensured that each student had an equal chance of being selected to participate in the study, regardless of their gender, age, or socioeconomic status. This made the sample of students in the study more representative of the population of secondary school students in Palpa district of Nepal. Additionally, random sampling is considered to be an objective and unbiased sampling method, making the findings of the study more reliable and generalizable to the wider population.

Students with physical disabilities and absent in school at the time of data collection were excluded from the study. The study included only adolescent students and excluded those who were more than 19 years of age. The study selected grade eight and nine students because they are in the early adolescence stage, and this period is critical for forming health behaviors that may last into adulthood. Additionally, physical activity levels have declined with increasing age during adolescence. Data were collected using a modified version of the Physical Activity Questionnaire Adolescents (PAQ-A) questionnaire, which was validated for the Nepalese context through back-and-forth translation and pretesting.[4] The questionnaire was administered in the Nepali language to ensure maximum participation. The first part of the questionnaire consisted of general information such as age, gender, marital status, distance from school, mode of transport while going to school, playground availability at school and home, and involvement in extracurricular activities. The second part of the questionnaire consisted of involvement in physical activity for how often? ('I do not do physical activity' for no physical activity, 'Hardly ever' for 1 to 2 times a week, 'sometimes' for 3 times a week, 'often' for 4 to 5 times a week and 'always' for 6 to 7 times a week), during break-time (Sat down or walk around, 'ran around or played a bit', 'played hard most of the time'), after school activity ('none', '1 to 3 times last week' and '>4 times last week') and during weekend ('none', '1 to 2 hours in last week', '>3 hours in last week'), and for how long? (The length of time in which an activity or exercise is performed.) The physical activity was defined as any bodily movement that requires energy expenditure and muscle contraction. The PAQ-A asked about the duration and frequency of physical activities, including playing games, sports, walking to school, cycling, and planned exercises such as dance classes, with any activities lasting longer than ten minutes included in the study. Physical inactivity was defined as activities such as talking, reading, doing schoolwork, and sitting silently. The undergraduate medical students who were posted in the Department of Community Medicine for school-health programs were given orientation for data collection. The data collection date and time were fixed with the principal of each school. The questionnaire was distributed in the classroom for grades eight and nine of each school. The

students who were oriented would help the participants if any clarifications were needed. The participants filled in the questionnaire and returned.

Ethical approval was obtained from the Institutional Review Committee (IRC) of Lumbini Medical College (Protocol No: IRC-LMC-03/P-24). Written informed consent was obtained from the respective school principal on the grounds of loco parentis. The research team clarified the study purpose and ensured the confidentiality of the participant data. A total of 518 questionnaires were collected from the participants, and only 506 cases were included in the analysis due to incompleteness. Data cleaning procedures were followed to identify and exclude invalid or inconsistent responses. The data were entered and analyzed using the IBM Statistical Package for Social Sciences (SPSS) version 21.0. Descriptive analysis was performed using frequency, percentage, mean and standard deviation as per the need. Chi-square test was used to test the association between categorical variables. P-value less than 0.05 was considered as a statistically significant.

RESULTS

Nearly half (52.96%) were females and 81.02% were between the ages of 12 and 15 years with a mean age of 14.55±1.23 years. The majority of participants (82.80%) walked to school and 84% had sufficient playgrounds available at school. However, 62% of the participants did not have a playground or park near their homes. Furthermore, 91% of the participants were involved in some extracurricular activity (Table 1).

Table 1: Demographic characteristics of the study participants (N=506)

Variables		Number	Percentage (%)
Age group (in years)	12-15	410	81.02
	16-19	96	18.98
Mean age	14.55 ±1.23 years		
Sex	Female	268	52.96
	Male	238	47.04
Marital status	Married	7	1.38
	Unmarried	499	98.72
Part-time job	No	484	95.65
	Yes	22	4.35
Distance to school (in minutes)	<10	154	30.44
	10-30	231	45.65
	>30	121	23.91
Mode of transport	Walk	419	82.80
	Cycle	2	0.40
	Bike/Bus	85	16.80
Playground availability at school	Yes	425	84.00
	No	81	16.00
Park or playground availability around the home	Yes	191	37.74
	No	315	62.26
Extra-curricular activity	Yes	461	91.10
	No	45	8.90

Table 2 shows the gender difference in involvement in physical activity almost half of the students (45.84%) were involved 'sometimes' in physical activity. Most participants (84.18%) sat down or walked around during break time, while more than half was not involved in after-school activities (53.35%). Nearly half of the students (49.20%) had physical activity of one to two hours during the weekend, with internal motivation (85.57%) cited as the major factor for involvement in physical activity. There were significant differences in physical activity involvement, break time physical activity, after-school physical activity, and the weekend physical activity between males and females. (p-value <0.001)

Table 2: Physical activity involvement among males and females (during the last week) (N= 506)

	Variables	Male n(%)	Female n(%)	Total n(%)	Chi-square value	P-value
Involvement in physical activity	I do not do physical activity	15 (22.72)	51 (77.28)	66 (13.04)	84.62	<0.001
	Hardly ever	17 (21.25)	63 (78.75)	80 (15.81)		
	Sometimes	107 (46.12)	125 (53.88)	232 (45.84)		
	Quite often	34 (73.91)	12 (26.09)	46 (9.09)		
	Always	65 (79.26)	17 (20.74)	82 (16.22)		
Break time physical activity	Sat down or walk around	186 (43.66)	240 (56.34)	426 (84.18)	32.62	< 0.001
	Ran around & played a bit	40 (63.49)	23 (36.51)	63 (12.45)		
	Played a hard-most time	12 (70.58)	5 (29.42)	17 (3.35)		
	None	110 (40.74)	160 (59.26)	270 (53.35)		
After-school activity	1-3 times last week	86 (49.42)	88 (50.58)	174 (34.38)	27.54	<0.001
	>4 times last week	42 (67.74)	20 (32.26)	62 (12.27)		
	None	36 (21.55)	131 (78.45)	167 (33.00)		
Physical activity during the weekend	For 1-2 hours	144 (57.83)	105 (42.17)	249 (49.20)	70.83	<0.001
	>3 hours	58 (64.45)	32 (35.55)	90 (17.80)		
Motivation for physical activity	Internal motivation	206 (47.57)	227 (52.43))	433 (85.57)	0.53	0.55
	External motivation	32 (43.83)	41 (56.17)	73 (14.43)		

Table 3 shows the differences in the level of physical activity according to schools in urban or rural municipalities. The students in the rural municipality were more likely to engage in physical activities during break time. However, there was no significant difference in after-school physical activity levels between the two municipalities (p-value=0.40).

Table 3: Comparison of physical activity between schools of the urban and rural municipalities during last week

Variables		Urban Municipality	Rural Municipality	Total	Chi-square value	P-value
Involvement in physical activity	I do not do physical activity	38 (57.57)	28 (42.43)	66 (13.04)	15.20	0.004
	Hardly ever	23 (28.75)	57 (71.25)	80 (15.81)		
	Sometimes	99 (42.67)	133 (57.33)	232 (45.85)		
	Quite often	14 (30.43)	32 (69.57)	46 (9.10)		
	Always	31 (37.80)	51 (62.20)	82 (16.20)		
Break time physical activity	Sat down or walk around	185 (43.42)	241 (56.58)	426 (84.18)	11.64	0.02
	Ran around & played a bit	17 (26.99)	46 (73.01)	63 (12.45)		
	Played a hard-most time	3 (17.64)	14 (82.36)	17 (3.37)		
	None	115 (42.60)	115 (57.40)	270 (53.36)		
After-school activity	1-3 times last week	61 (35.05)	113 (64.95)	174 (34.39)	4.01	0.40
	>4 times last week	29 (46.77)	33 (53.33)	62 (12.25)		
Physical activity during the weekend	None	85 (50.90)	82 (49.10)	167 (33.00)	12.59	0.013
	1-2 hours	89 (35.74)	160 (64.26)	249 (49.20)		
	>3 hours	31 (34.44)	59 (65.56)	90 (17.80)		

Table 4 shows that only 23.10% of the participants engaged in physical activity for more than 60 minutes per day, as recommended by WHO. Females were less likely to achieve the recommended physical activity levels than males (p-value=0.02). However, there was no significant difference in physical activity levels between urban and rural municipalities (p-value=0.93). Overall, the mean time spent in physical activity was 30.76±23.02 minutes per day.

Table 4: Physical activity as per WHO recommendation during last week (N=506)

Variables	WHO recommended physical activity per day		p-value	Mean physical activity per day (in minutes)
	<60 min	≥60 min		
Male	172 (72.27%)	66 (27.73%)	0.02	30.76±23.02
Female	217 (81.00%)	51 (19.00%)		
Total N (%)	389 (76.90)	117 (23.10)		
Urban Municipality	158 (77.07%)	47 (22.93%)	0.93	
Rural Municipality	231 (76.74%)	70 (23.26%)		

DISCUSSION

The study assessed physical activity and its associated factors among secondary school students in Palpa district of Nepal. Results showed that only 25.30% of students were involved in physical activity quite often or always. Furthermore, only 23.10% of the participants met the daily WHO recommendation for physical activity. This figure is considerably lower than Nepal's physical activity report card, which showed physical activity levels at less than <40%.[10] It was observed that 45.85% of the students sometimes engaged in physical activity, while 84.18% remained seated or standing during break time at school. This could be due to a limited break time that is only given for snacks at school or inadequate playing materials.

When comparing gender, females were found to be less likely to engage in physical activity than males, which is supported by other studies.[4] A survey conducted to identify risk factors for non-communicable diseases in Nepal in 2019 also highlighted the lack of female engagement in physical activities.[17] Adolescent females spend their break time talking to their friends instead of engaging in physical activities.[18] In a domestic setting, adolescent females are more confined to indoor activities and household chores than their male counterparts who are allowed to play.[13,19]

Another factor associated with a sedentary lifestyle is screen time through the use of electronic media such as television, computers, cell phones, and smartphones. This decrease in physical activity is a significant risk factor for multiple health outcomes such as cardiovascular disease, dyslipidemia, obesity, and mortality.[20] Watching television for more than two hours per day was also found to be a significant risk factor for being overweight in the adolescent age group.[21]

Although most participants walk to school, they fail to meet the recommended levels of physical activity. The academic performance of students is typically prioritized over physical activity in our setting which often results in reduced physical activity levels.[22]

People from varying socioeconomic backgrounds may engage in different types of sedentary activities, such as academic pursuits or screen time on mobile or television. However, these variances may not result in a significant difference in overall sedentary behavior between the two groups.[13]

In Nepal, physical activity, particularly physical activity is not a primary concern within the community or schools, and there is a general lack of awareness regarding the health risks associated with physical inactivity.[13]

The study was conducted in the hilly region of Nepal, which resulted in the lack of playgrounds or parks near students' homes as one of the barriers to involvement in physical activity. Typically, adolescents perceive leisure time as an

opportunity for rest, recreation, and entertainment, which can often take priority over physical activity. Contributing factors such as social norms, lack of support, absence of physical education in schools, and deprioritization of physical activity often result in low levels of physical activity among adolescents.[11]

The findings depict a noticeable dissimilarity in physical activity participation, break time physical activity, and the weekend physical activity among individuals residing in urban and rural locales. People residing in rural setups usually utilize their after-school hours and the weekends to engage in supplemental household chores, such as farming. Moreover, students in rural areas are preoccupied with fulfilling academic obligations, including completing school assignments and attending additional classes.

The present study has some limitations. The first limitation is the cross-sectional design, which does not allow for the establishment of causal relationships between physical activity and associated factors. The study only captures a snapshot of the situation at one point in time. Therefore, the results obtained cannot determine whether the factors identified are the cause or effect of physical activity levels. The second limitation is the self-reported nature of the data collected. Since participants reported their physical activity levels, there may be potential bias due to social desirability bias or inaccurate recall. The third limitation is related to sampling. The study employed a random sampling technique, which may not be representative of the entire Palpa district's population. Additionally, the study did not include private schools, which may have different physical activity levels than public schools. The fourth limitation is related to the study's generalizability. Since the study was conducted in only one district in Nepal, it may not be generalizable to other districts or regions in Nepal or other countries with different sociocultural contexts. Finally, the study did not explore the relationship between physical activity and mental health outcomes, such as depression and anxiety, which are prevalent among adolescents.

CONCLUSIONS

In conclusion, physical inactivity is a major health concern among adolescents, which can lead to several non-communicable diseases. This study has highlighted the low levels of physical activity among secondary school students in Palpa district of Nepal, with only a quarter of the students reported being engaged in physical activity quite often or always, and a mere 23.10% meeting the recommended WHO guidelines for daily physical activity. The study has identified several factors associated with low physical activity levels, including limited break time at school, lack of parks or playgrounds near homes, and gender differences, with females found to be less likely to participate in physical activity than males. Increased screen time and interpersonal and environmental barriers also contribute to decreased physical activity. Therefore, interventions that address these factors need to be implemented to promote physical activity among adolescents in the region, ultimately improving their health outcomes.

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AUTHORS CONTRIBUTION

SN did conceptualization, project administration, formal analysis, investigation, methodology, original draft preparation, reviewing & editing the manuscript, AM did the investigation, methodology, reviewing & editing of the manuscript, SS did the investigation, methodology, reviewing & editing the manuscript, DKK did the formal analysis, resources, visualization, review & editing the manuscript.

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