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Impact of Physical Activities on Concentration among students of Janaki Medical College and Teaching Hospital.

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Abstract

Introduction: Regular exercise, particularly among teenagers, has shown to positively influence brain development. Adolescents with higher aerobic fitness show better attention and thinking skills, emphasizing the importance of fitness for cognitive performance during this stage. Physical fitness, particularly aerobic capacity, is positively associated with academic achievement in third- and fifth-grade students, emphasizing the potential relevance of fitness to educational performance. Active students and those engaged in sports schools exhibit higher academic performance, implying potential cognitive benefits associated with physical activity. Encouraging regular exercise, especially among teenagers, is crucial for optimal brain development and cognitive performance in response to the impact of modern sedentary lifestyles on overall well-being.

Methods: The study is quantitative, descriptive cross-sectional study conducted in MBBS students of Janaki Medical College Teaching Hospital from 24th Jan 2024 to 12 March 2024. Semi-structured questionnaire was developed ans was followed by face to face interview.

Results: Many of the participants were male (62.3%) and female (37.7%). The association between physical activity patterns with favorable/unfavorable responses; most of the participants shoes unfavorable association in Running and walking (53.4%) and physical activities (51.1%) respectively.

Conclusion: The study was the association between post-activity behaviors, particularly showering. A large proportion of participants who showered after physical activity reported more favorable responses, which linked to personal hygiene, recovery, and relaxation. This suggested that participants who prioritize self-care and personal hygiene after exercise experience better health outcomes.

Keywords: Concentration; Impact; JMCTH; Physical Activities

Introduction

In our busy world, reliance on time-saving devices over physical activity is affecting both physical and mental health, prompting an investigation into the connection between regular exercise and improved concentration levels. Regular exercise, particularly among teenagers, has shown to positively influence brain development.[1] Adolescents with higher aerobic fitness show better attention and thinking skills, emphasizing the importance of fitness for cognitive performance during this stage.[2] Physical fitness, particularly aerobic capacity, is positively associated with academic achievement in third- and fifth-grade students, emphasizing the potential relevance of fitness to educational performance.[3]Active students and those engaged in sports schools exhibit higher academic performance, implying potential cognitive benefits associated with physical activity.[4]The study in an urban area of Nepal found a high prevalence of low physical activity among high school students, especially females, highlighting the need for targeted interventions considering specific factors like school type, mode of transport, family support, and the availability of playgrounds/parks around home.[5]The study using SOPLAY to see how active students are during leisure time at school, finding that most aren't very active, suggesting the need for changes to attract more students, especially girls, to participate in physical activities.[6]A daily 6-minute coordinated-bilateral physical activity breaks in classrooms improves students' attention and concentration, suggesting an effective strategy for enhancing cognitive performance.[7] Effective curriculum planning, rather than the subject itself, appears to influence concentration levels, as indicated by increased focus toward the end of the lesson.[8]In summary, by encouraging regular exercise, especially among teenagers, is crucial for optimal brain development and cognitive performance in response to the impact of modern sedentary lifestyles on overall well-being.

Materials and Methods

Study Design: A descriptive cross sectional study was conducted.

Study Methods: The study was quantitative cross-sectional study method was carried out to find out the impact that how physical activities and concentration are correlated in students and teachers of JMCTH.

Study site and its justification: Janaki Medical College and Teaching Hospital was taken for convenient.

Study duration: 24th Jan 2024 to 12 March 2024

Study population: Students studying MBBS at JMCTH

Inclusion and exclusion criteria: MBBS students of JMCTH was enrolled. Those students who were not present and not welling to participate during data collection were excluded.

Data collection technique: Semi structured questionnaire was followed by face to face interview. Written consent was maintained by coding each questionnaire. Anonymity was maintained.

Data collection Procedure: Semi-structured questionnaire was developed by researchers after reviewing the related literatures. The research instrument consists of following three parts:

Part I: Socio-demographic variables of respondents

Part II: Semi structured questionnaire related to physical activities and concentration of respondents.

Part III: Five point Likert's Scale related to students and faculties on concentration of the respondents. It included 10 statements. Scoring will be done as 1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree). Total score for perception will be 50 in case of optimum value and 10 with its least value. The level of perception was calculated by using the median score (90) and was categorized as a score equals to and above median (>=90) = favorable perception and score below median score (<90) = unfavorable perception.

Pretesting will be done in 10% sample in Madhesh Institute of Health Sciences, Janakpurdham.

Data will be collected within same day. The questionnaires will be made based on the WHO guidelines,9,10 then will be printed after which it will be distributed to the participants of JMCTH.

Pre-testing of tool: About 5% of study sample was taken and pretested in similar characteristics in Bachelor level students of Madhesh Institute of Health Sciences, Janakpudham and necessary modification was done as required after pre-testing.

Data management and analysis: Data entry will be done in Epi-data 3.1 version. After collection of data, data will be checked out systematically then edited, coded and entered. A data analysis will be done in IBM SPSS 16.0 version. Descriptive statistics in terms of frequency and percentage will be used to present the data and chi – square test will be applied to test the association.

Sample size: Sample was taken as follows: MBBS 19th Batch=50 students, MBBS 18th Batch=50 students, MBBS 17th Batch=50 students, MBBS 16th Batch=50 students, MBBS 15th Batch=70 students and MBBS 14th Batch=50 students. Hence the total numbers of MBBS students were 320. In which 170 students were absent during our data collection period. Hence the Sample size was 150

Ethical Consideration: The ethical approval was obtained from IRC-JMC (Ref. no: 018/IRC-JMC/2024/012) on May 28, 2024.

Results

Table 1: Gender Distribution across Different Batches of MBBS Students

S.N.	Batch	Gender		Total	Chi-squared Test (p-value)
		Female	Male		
1	13th Batch	22 (27.2%)	50 (72.8%)	81(100%)	<0.001
2	14th Batch	20 (40.8%)	29 (59.2%)	49 (100%)	0.199
3	15th Batch	19 (27.1%)	51 (72.9%)	70 (100%)	<0.001
4	16th Batch	23 (46.0%)	27 (54.0%)	50 (100%)	0.572
5	17th Batch	25 (50.0%)	25 (50.0%	50 (100%)	1.00
6	18th Batch	23 (46.0%)	27 (54.0%)	50 (100%)	0.572
	Total	132 (37.7%)	218 (62.3%)	350 (100%)	
Overall Comparison (Chi-squared test); p-value=0.019					

There is a significant gender distribution difference across batches, with more males overall (62.3%) compared to females (37.7%).Significant differences in gender ratios were found in the 13th batch (p<0.001p < 0.001p<0.001), 15th batch (p<0.001p < 0.001p<0.001), and overall (p=0.019p = 0.019p=0.019).No significant differences were observed in the 14th, 16th, 17th, and 18th batches, indicating a relatively balanced gender ratio in these groups.

Table 2: Gender-wise comparison of physical activities and their effect on concentration. Across different Batches of MBBS Students.

S.N.	Batch	Gender		Total	Independent t-Test (p-value)
		Female	Male		
1	13th Batch	24.05±1.09	25.68±2.69	25.23±2.47	0.007
2	14th Batch	23.90±1.33	25.31±0.93	24.73±1.30	<0.001
3	15th Batch	22.63±0.76	24.20±1.65	23.77±1.62	<0.001
4	16th Batch	20.43±2.09	24.56±1.34	22.66±2.69	<0.001
5	17th Batch	21.52±1.94	24.80±6.72	23.16±5.17	0.023
6	18th Batch	21.30±1.69	21.07±1.54	21.18±1.60	0.617
	Total	22.23±2.06	24.47±3.18	23.63±3.01	<0.001

In all batches except the 18th batch (p=0.617p = 0.617p=0.617), males had significantly higher scores than females, indicating better concentration or physical activity engagement. The overall difference in scores was significant (p<0.001p < 0.001p<0.001), with males scoring higher (24.47 ± 3.18) compared to females (22.23 ± 2.06).

Table: 3 Associations between physical activity patterns with favorable/unfavorable responses among participants.

S.N.	Variables	Response		Total	Chi-squared Test (p-value)
		Unfavorable	Favorable		
Physical activities in hours					
1	0-30 min	82 (58.6%)	58 (41.4%)	140 (100%)	0.043
2	30-60 min	55 (53.4%)	48 (46.6%)	103 (100%)	0.049
3	60-90 min	24 (58.5%)	17 (41.5%)	41 (100%)	0.274
4	90-120 min	23 (62.2%)	14 (37.8%)	37 (100%)	0.139
5	120-150 min	3 (10.3%)	26 (89.7%)	29 (100%)	<0.001
	Total	187 (53.4%)	163 (46.6%)	350 (100%)	
Overall Comparison (Chi-squared test); p-value = <0.001					
Types of physical activities					
1	Work out	35 (50.7%)	34 (49.3%)	69 (100%)	0.904
2	Walking/Running	91 (51.7%)	85 (48.3%)	176 (100%)	0.651
3	Sports	41 (51.9%)	38 (48.1%)	79 (100%)	0.736
4	Others	20 (76.9%)	6 (23.1%)	26 (100%0	0.006
5	Total	187 (53.4%)	163 (46.6%)	350 (100%)	
Overall Comparison (Chi-squared test); p-value = 0.100					
Types of sports					
1	Volleyball	18 (46.2%)	21 (53.8%)	39 (100%)	0.631
2	Badminton	41 (74.5%)	14 (25.5%)	55 (100%)	<0.001
3	Football	35 (53.8%)	30 (46.2%)	65 (100%)	0.535
4	Cricket	27 (49.1%)	28 (50.9%)	55 (100%)	0.893
5	Others	66 (48.5%)	70 (51.5%)	136 (100%)	0.732
	Total	187 (53.4%)	163 (46.6%)	350 (100%)	
Overall Comparison (Chi-squared test); p-value = 0.014					

Vigorous intensity activity					
1	Yes	66 (49.6%)	67 (50.4%	133 (100%)	0.931
2	No	121 (55.8%)	96 (44.2%)	217 (100%)	0.091
	Total	187 (53.4%)	163 (46.6%)	350 (100%)	
Overall Comparison (Chi-squared test); p-value = 0.264					
Time of physical activities					
1	Morning	82 (56.6%)	63 (43.4%)	145 (100%)	0.115
2	Afternoon	23 (42.6%)	31 (57.4%)	54 (100%)	0.276
3	Evening	82 (54.3%)	69 (45.7%)	151 (100%)	0.290
	Total	187 (53.4%)	163 (46.6%)	350 (100%)	
Overall Comparison (Chi-squared test); p-value = 0.206					
After physical activity					
1	Shower	118 (62.1%)	72 (37.9%)	190 (100%)	0.001
2	Shower and take nap	21 (33.9%)	41 (66.1%)	62 (100%)	0.696
3	Shower and study	31 (52.5%)	28 (47.5%)	59 (100%)	0.014
4	Take a nap	17 (43.6%	22 (56.4%	39 (100%)	0.432
	Total	187 (53.4%)	163 (46.6%)	350 (100%)	
Overall Comparison (Chi-squared test); p-value = 0.001					

Duration of physical activity significantly impacted perceptions (p<0.001p < 0.001p<0.001). Longer durations (120-150 minutes) were associated with a higher proportion of favorable perceptions (89.7%). Shorter durations (<90 minutes) showed unfavorable perceptions in most cases, with significant differences noted for 0-30 minutes (p=0.043p = 0.043p=0.043) and 30-60 minutes (p=0.049p = 0.049p=0.049. Significant differences in perceptions were noted only for badminton (p<0.001p < 0.001p<0.001), with a higher proportion of unfavorable perceptions.

Other sports, including volleyball, football, and cricket, did not show significant differences similarly no significant difference in perceptions between those engaging in vigorous activities (p=0.931p = 0.931p=0.931) and those who did not (p=0.091p = 0.091p=0.091) was observed, also no significant association between the timing of physical activities (morning, afternoon, evening) and perceptions was noted. Moreover observing on post activity habits Significant differences were noted in post-activity habits (p=0.001p = 0.001p=0.001): Showering alone was associated with unfavorable perceptions (p=0.001p = 0.001p=0.001) while Showering and studying showed significant favorable perceptions (p=0.014p = 0.014p=0.014).

The overarching chi-squared test indicates statistically significant differences across various groups for duration ($p < 0.001$), types of sports ($p = 0.014$), and post-activity habits ($p = 0.001$). This suggests that these factors are influential in determining favorable or unfavorable responses.

Discussion

This study was performed in Janaki Medical College and Teaching Hospital, Nepal to an undergraduate MBBS student where we tried to see the difference in gender interaction with the duration and types of physical activity assigned to them as well as post-exercise habits, on perceptions of concentration and engagement. We observed notable gender-based differences with males outperforming females in concentration or physical activity engagement in all batches except for the 18th batch ($N = 218$; $\eta = 0.178$). More specifically, how long they exercised for as well as what they did afterwards, helped contribute to a positive perception.

Study of Tomporowski et al research suggests moderate to vigorous physical activity positively influences cognitive function especially executive functioning11 which may to an extent explain our higher male scores. However, there are some other study indicates that girl had comparable or better concentration outcomes than boys when the activity context and support were identical for both genders.12 Such differences may have been due to cultural or institutional reasons though this was not closely analyzed in this study

The analysis of physical activity duration reveals that individuals who were engaged in higher durations of physical activity (120-150 minutes per week) were likely to have beneficial responses. In contrast, those who engaged in less than 30 minutes of activity weekly were more likely to report unfavorable outcomes, underlining the importance of maintaining a consistent and moderate level of physical activity for overall health improvement.) Study have reveled frequent and periodic physical activity makes neurogenesis better and connectivity in brain areas associated with attention and learning.[13] Studies have also emphasized that shorter durations (<90 minutes) may not yield immediate cognitive benefits, corroborating our findings of unfavorable perceptions for these durations.[14]

This study has an interesting result observed only for badminton but not for volleyball, football, or cricket suggesting that individual over team sports might have influenced perceptions differently. Badminton, being an individual sport with a high skill component, requires long attention and coordination, which might explain the unfavorable perceptions in less-experienced participants. Team sports, in contrast, provide social interaction, potentially buffering unfavorable perceptions.[15]

Conclusion

One of the notable discoveries in the study was the association between post-activity behaviors, particularly showering. A large proportion of participants who showered after physical activity reported more favorable responses, which could indicate a habitual behavior linked to personal hygiene, recovery, and relaxation. This is in line with the idea that recovery routines, including showers, play a crucial role in post-exercise recovery and overall well-being.[16] However, the results also showed that showering alone (without additional activities like napping or studying) was more commonly associated with favorable outcomes. This suggested that participants who prioritize self-care and personal hygiene after exercise experience better health outcomes.

However the study has some limitation being cross sectional study design it is strenuous to manifest causality between physical activity and concentration outcome and in addition to it being a self-reported data on individual perception result has some potential to fall under recall bias. In third place considering the study's sample size and targeting the specific sports this limits the generality to large number of population

Our study underscores the critical roles of gender, activity duration, and post-activity routines in influencing perceptions of concentration and engagement. Future research should adopt longitudinal designs to better understand causal relationships. Additionally, exploring cultural and psychosocial factors, alongside broader activity types and routines, could provide more comprehensive insights.saz

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