




Patterns of physical activity amidst COVID-19 among medical interns

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ABSTRACT

Introduction and aim. The COVID-19 pandemic restricted our daily lives significantly. This adversely affected the physical activity (PA) and productivity of students, including medical interns, who worked tirelessly during the pandemic. The study aimed to evaluate the changes in PA patterns and associated factors due to the imposed lockdown in medical interns compared to pre-pandemic levels.

Material and methods. A cross-sectional study was conducted among consenting medical interns of the 2020-21 batch in a medical college in Bhubaneswar, selected by convenience sampling. They were contacted by email and briefed about the study. Data on demography, exercise patterns (pre-, during, and post-COVID-19), and associated factors was collected by an electronic survey format (Google form). Data was analyzed using EPI info and interpreted in frequencies, percentages, and the chi-square test. A p-value < 0.05 was considered statistically significant.

Results. Of 104, 54.28% were females. The frequency of exercise reduced by 13.92% during COVID-19. Around 56.9% of interns exercised regularly pre-pandemic which dropped to 33.3% during the pandemic. The change in PA pattern was significantly associated with regularity of exercise (p < 0.001).

Conclusion. Evaluating the extent of physical inactivity will enable the administration to provide appropriate support to the interns to take equal care of their health as their patients.

Keywords. COVID-19, exercise, lockdown, medical interns, physical activity, well-being

Introduction

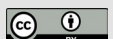
A novel coronavirus known as COVID-19, which originated in Wuhan, China, first appeared in India at the beginning of 2020. The World Health Organization declared it a pandemic and a global public health emergency on March 11, 2020.¹ Fever, cough, and sore throat were common symptoms of this acute respiratory illness. On the other hand, in moderate-to-severe cases, the illness worsens and leads to breathing problems,

problems with non-respiratory organs like the heart and kidneys, and even death.² Lockdowns were implemented everywhere to mitigate the risk of infection and stop its spread.³ Other preventive strategies included social distancing, self-isolation, working from home, home quarantines, social gathering bans, and the closure of local recreation centers, parks, and playgrounds. These unexpected drastic measures caused significant disruption of the daily routines and lifestyles of the general

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public. This had a significant impact on the daily physical activity (PA) (defined as any skeletal muscle-produced movement that causes an energy expenditure above the basal level) of millions of people in India and around the world.^{4,5} Worldwide, people reported difficulties in getting the recommended amount of physical activity during the pandemic, with some regions seeing a 50 percent drop in physical activity. The scarcity and unequal distribution of safe outdoor community resources (such as parks, trails, sports facilities, and sidewalks) that encourage physical activity is one factor contributing to this decline.⁶ These undesirable behaviors have been connected to a lower level of cardiopulmonary health as well as a higher chance of developing long-term illnesses like obesity, cardiometabolic disease, and early mortality.⁷⁻⁹ The World Health Organization (WHO) suggests engaging in at least 150 minutes of moderate exercise, 75 minutes of intense exercise, or a mix of the two each week.¹⁰ WHO aims to reduce the prevalence rate of physical inactivity by 15% worldwide by 2030.¹¹ Internship is a crucial phase in the life of medical students which comes with new responsibilities and added stress with tireless duty hours.¹² Due to erratic working hours, and lack of adequate sleep, the motivation to engage in physical activity fades away.¹³ The COVID-19 restrictions further created an imbalance in their physical activity patterns, motivational status, and mental well-being among the medical interns.¹⁴ A lot of research has been done comparing the disease status of people pre and post-pandemic.^{15,16} Studies have been done on the changes in physical activity patterns among the general population in China and Europe where there was a significant decline in physical activity engagement during the COVID-19 pandemic.¹⁷⁻²⁰

Aim

However, there is a paucity of literature about the PA patterns and mental well-being of medical students in India amidst the COVID-19 pandemic. Hence this study aimed to evaluate the changes in PA patterns, and associated factors due to the imposed lockdown in medical interns compared to pre-pandemic levels.

Material and methods

A cross-sectional study was conducted by the Department of Community Medicine, Kalinga Institute of Medical Sciences, Bhubaneswar between May 2021 and June 2021. The ethical approval was obtained from the Institutional Ethics Committee (reference number: KIIT/KIMS/IEC/684/2021) and the study was carried out following the Declaration of Helsinki. The target population was medical interns of the 2020-21 academic batch. Interns who consented to the study and completed the questionnaire were included as the final study sample. There were no exclusion criteria. A total of 150 medical interns

were selected through convenient sampling. The survey questionnaire used was pre-validated and pre-tested. It consisted of four sections: demographics, exercise patterns (pre-COVID-19, during COVID-19, and post-COVID-19 after reduction in restrictions and resumption of normal duty hours in the hospital), motivating factors for regular physical activity, and finally the barriers to regular physical activity. The exercising patterns were analyzed by including questions like if the participants exercised, the type of exercise they were involved in, duration of time spent exercising per week, place preferred for carrying out the physical activity, and regularity of the physical activity. The type of physical activity was classified into 'vigorous', 'moderate', and 'light' as per WHO guidelines.²¹ The regularity of physical activity was classified arbitrarily as 'irregular (< 2 days/week)', 'regular but skipped sometimes (2-3 days/week)', and 'very strict (5 days/week)'. The participants were contacted by email and briefed about the purpose of the study. The participants answered the online questionnaire via the link shared in their email. There was no time constraint, so the participants could answer the questions leisurely. The confidentiality of the participants was ensured. Data collected was compiled in Microsoft Excel and was analyzed using EPI info software. The descriptive data was interpreted in frequencies and percentages. The chi-square test was used for testing association. Linear trend analysis showed the changes in PA. A p-value < 0.05 was considered statistically significant.

Results

Out of 150 medical interns, a total of 104 participants completed the questionnaire. The study sample consisted of 57 (54.8%) females and 47 (45.2%) males. The mean (\pm SD) age of the study sample was 25.04 (\pm 1.29). The baseline characteristics showed that around 65 (62.7%) interns exercised pre-pandemic, 56 (53.8%) exercised during the pandemic, and 62 (59.6%) exercised after the imposed pandemic restrictions were reduced. Figure 1 depicts the linear trend diagram of the changes in the engagement of study participants in PA pre-, during, and post-COVID-19 pandemic.

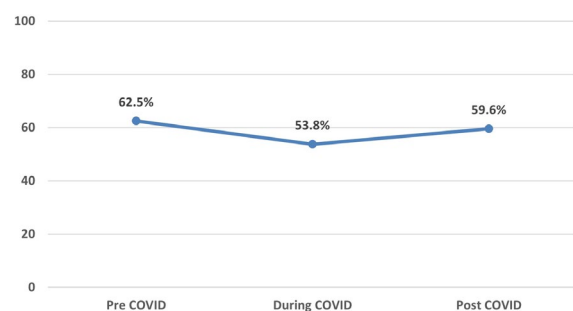


Fig. 1. Linear trend analysis of the changes in engagement in physical activity (%) pre-, during, and post-COVID-19

Pre-COVID-19, the study participants who exercised, were mostly involved in moderate exercise (28, 26.9%), for 2–4 hours/week (34, 32.7%), and exercise in the room (26, 25%). Around 37 (35.6%) of the interns were regular in their exercise schedule with the occasional skipping. Table 1 shows the characteristics of the patterns of PA before the COVID-19 pandemic.

Table 1. Characteristics of the patterns of PA before the COVID-19 pandemic

| Variable | Frequency of respondents (n=104) | Percentage |
|--------------------------------------|-----------------------------------|------------|
| Did you exercise? | No | 39 (37.5) |
| | Yes | 65 (62.5) |
| If yes, how would you categorize it? | Light | 27 (26) |
| | Moderate | 28 (26.9) |
| | Vigorous | 10 (9.6) |
| | No exercise | 39 (37.5) |
| How much time did you spend weekly? | <2 hours | 22 (21.2) |
| | 2–4 hours | 34 (32.7) |
| | >4 hours | 9 (8.8) |
| | No exercise | 39 (37.5) |
| Where did you exercise? | Gym | 15 (14.4) |
| | Park | 24 (23.1) |
| | Room | 26 (25) |
| | No exercise | 39 (37.5) |
| How regular were you? | Irregular | 20 (19.2) |
| | Regular, though skipped sometimes | 37 (35.6) |
| | Very Strict | 8 (7.7) |
| | No exercise | 39 (37.5) |

Table 2. Characteristics of the patterns of PA during the COVID-19 pandemic

| Variable | Frequency of respondents (n=104) | Percentage |
|--------------------------------------|-----------------------------------|------------|
| Did you exercise? | No | 48 (46.2) |
| | Yes | 56 (53.8) |
| If yes, how would you categorize it? | Light | 22 (21.2) |
| | Moderate | 23 (22.1) |
| | Vigorous | 12 (11.5) |
| | No exercise | 47 (45.2) |
| How much time did you spend weekly? | <2 hours | 17 (16.3) |
| | 2–4 hours | 24 (23.1) |
| | >4 hours | 16 (15.4) |
| | No exercise | 47 (45.2) |
| Where did you exercise? | Gym | 10 (9.6) |
| | Park | 14 (13.5) |
| | Room | 33 (31.7) |
| | No exercise | 47 (45.2) |
| How regular were you? | Irregular | 18 (17.3) |
| | Regular, though skipped sometimes | 19 (18.3) |
| | Very Strict | 20 (19.2) |
| | No exercise | 47 (45.2) |

During COVID-19, the study participants who exercised were mostly involved in moderate exercise (23, 22.1%), for 2–4 hours/week (24, 23.1%), and exercised

in the room (33, 31.7%). Around 20 (19.2%) of the interns were regular in their exercise schedule with the occasional skipping. Table 2 shows the characteristics of the patterns of PA during the COVID-19 pandemic.

Table 3. Characteristics of the patterns of PA after the COVID-19 pandemic

| Variable | Frequency of respondents (n=104) | Percentage |
|--------------------------------------|-----------------------------------|------------|
| Did you exercise? | No | 42 (40.4) |
| | Yes | 62 (59.6) |
| If yes, how would you categorize it? | Light | 15 (14.4) |
| | Moderate | 38 (36.5) |
| | Vigorous | 9 (8.7) |
| | No exercise | 42 (40.4) |
| How much time did you spend weekly? | <2 hours | 17 (16.3) |
| | 2–4 hours | 39 (37.5) |
| | >4 hours | 6 (5.8) |
| | No exercise | 42 (40.4) |
| Where did you exercise? | Gym | 11 (10.6) |
| | Park | 23 (22.1) |
| | Room | 28 (26.9) |
| | No exercise | 42 (40.4) |
| How regular were you? | Irregular | 18 (17.3) |
| | Regular, though skipped sometimes | 38 (36.5) |
| | Very Strict | 6 (5.8) |
| | No exercise | 42 (40.4) |

Table 4. Association of different variables with the changing patterns of PA amidst COVID-19

| Variable | Group | χ^2 (p-value) * | | | |
|----------------------------|-----------------------------------|----------------------|--------------|------------|-----------------|
| | | Pre COVID | During COVID | Post COVID | |
| Did you exercise? | No | n 39 | 48 | 42 | 1.665 (0.435) |
| | Yes | % 37.5% | 46.2% | 40.4% | |
| Categorization of exercise | Light | n 27 | 22 | 15 | 7.082 (0.132) |
| | | % 41.5% | 37.5% | 24.2% | |
| | Moderate | n 28 | 23 | 38 | |
| | | % 43.1% | 41.1% | 61.3% | |
| | Vigorous | n 10 | 12 | 9 | |
| | | % 15.4% | 21.4% | 14.5% | |
| Time spent weekly | <2 hours | n 22 | 17 | 17 | 10.361 (0.11) |
| | | % 32.3% | 28.6% | 27.4% | |
| | >4 hours | n 9 | 16 | 6 | |
| | | % 13.8% | 28.6% | 9.7% | |
| | 2–4 hours | n 34 | 24 | 39 | |
| | | % 52.3% | 42.9% | 62.9% | |
| Regularity of exercise | Irregular | n 20 | 18 | 18 | 17.728 (<0.001) |
| | | % 30.7% | 31.6% | 29.03% | |
| | Regular, though skipped sometimes | n 37 | 19 | 38 | |
| | | % 56.9% | 33.3% | 61.3% | |
| | Very strict | n 8 | 20 | 6 | |
| | | % 12.3% | 35.1% | 9.7% | |

Post-COVID-19, the study participants who exercised, were mostly involved in moderate exercise (38, 36.5%), for 2–4 hours/week (39, 37.5%), and exercised in the room (28, 26.9%). Around 38 (36.5%) of the interns were regular in their exercise schedule with the occasional skipping. Table 3 shows the characteristics of the patterns of PA after the COVID-19 pandemic when the restriction measures were relaxed.

The association of different variables with the outcome was tested by the chi-square test. The regularity of the exercise schedule was significantly associated with the changes in PA patterns pre-, during, and post-COVID-19 ($p < 0.001$). Table 4 depicts the association of different variables with the changing patterns of PA amidst COVID-19.

Perceived physical benefits like losing weight that improved their appearance were the most common motivating factors for exercising. The different motivating factors are depicted in Figure 2.

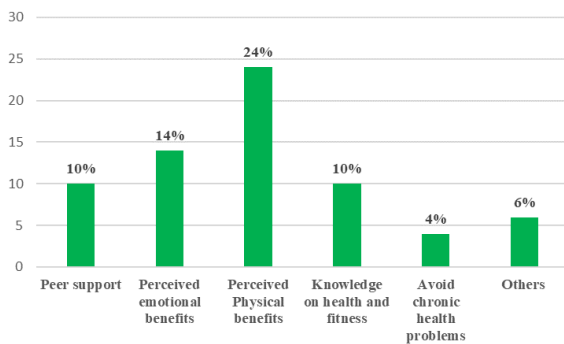


Fig. 2. Motivating factors facilitating PA among study participants (in %)

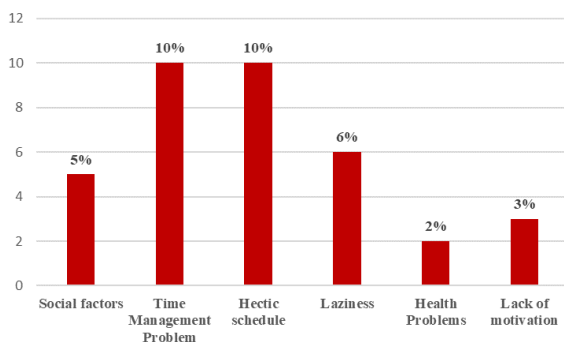


Fig. 3. Inhibiting factors affecting PA among study participants (in %)

The most common inhibiting factors affecting physical activity among the study participants were time management problems and hectic schedules due to erratic work timings. The other factors have been depicted in Figure 3.

Discussion

This study aimed to evaluate the changes in the physical activity patterns, and associated factors due to the

imposed lockdown in medical interns compared to pre-pandemic levels. Out of 120 medical interns, a total of 104 participants were included in the final analysis. The study sample consisted of 57 (54.8%) females and 47 (45.2%) males. The mean (\pm SD) age of the study sample was 25.04 (\pm 1.29). A study by Al-Hindawi et al. also reported female preponderance with 68 (62%) females and 42 (38%) males.²² The baseline characteristics showed that around 65 (62.7%) interns exercised pre-pandemic, 56 (53.8%) exercised during the pandemic, and 62 (59.6%) exercised after the imposed pandemic restrictions were reduced. There was a 14% decline in PA during the pandemic. Larrad-Rodriguez et al. also reported a 29.5% and 18.3% decline in vigorous and moderate PA among university students during lockdown.²³ A similar decrease in physical activity during the pandemic was also observed by Constandt et al. and Rosa D et al.^{24,25} This decrease may be due to the increase in sedentary behavior due to the imposed lockdown restrictions. Additional research has demonstrated that these patterns negatively impact people’s health, leading to immunological dysfunction and a decline in mental well-being.²⁶ Therefore, maintaining PA is crucial for people in good health or those with chronic illnesses to avoid or lessen the likelihood of developing new health issues and a deterioration in their quality of life down the road.^{27,28} In our study, the study participants preferred to exercise in the room, which increased by 26% during the lockdown. This was probably due to the closure of parks and gyms. Someway or the other, the medical interns remained physically active during the lockdown. A study by Wafi et al. also reported higher odds of maintaining physical activity among medical students who had exercise equipment in their homes during the pandemic.²⁹ The pattern of physical activity was significantly associated with the regularity of exercise among the participants ($\chi^2 = 17.728$, $p = 0.0013$). However, there was no significant association of physical activity patterns with the type of exercise and the time spent on exercise weekly. A study by Al-Mhanna et al. however found a significant association between the type of exercise and physical activity ($p < 0.001$).³⁰ The changes in the regularity of physical activity might be due to added household tasks like cooking, washing utensils, and cleaning rooms due to the non-availability of housekeeping staff during the lockdown, which made it difficult to devote time to exercise. The motivating factors for engaging in physical activity, as mentioned by the study participants, were the perceived physical and emotional benefits, the importance of being physically fit, avoiding chronic diseases, and support from peers. The barriers mentioned were time management, hectic work schedule, laziness, social embarrassment, current health problems, and lack of motivation. Nielsen et al. and Cornine A et al. also reported anxi-

ety, fear, and lack of motivation as factors responsible for decreased PA levels during the pandemic.^{31,32} Research also suggests that since exercise self-efficacy and motivation can be difficult to overcome early in the behavioral change process, social and institutional support may play a significant role in helping inactive people change their behavior.³³ Providing social, mental, and institutional opportunities for regular PA is crucial for sustaining a healthy lifestyle and lowering all-cause mortality.³⁴ To help medical interns understand the value of exercise and prepare them to suggest physical activity interventions in their future clinical practice, a concentrated education program on physical activity should be incorporated throughout the curriculum.³⁵

Study limitations

Although the current study emphasizes how the COVID-19 lockdown negatively affected medical interns' physical activity, it should be noted that there are a few limitations. The study is cross-sectional and was conducted in a single institute, using convenience sampling and self-selection. This makes the result less generalizable and subject to selection bias. We only received 104 responses out of the 120 participants in the intended sample. Even though we were able to identify significant correlations between the variables and changes in physical activity, more participants would have allowed for the possibility of additional insights, and a larger study is necessary to delve deeper into this topic. Participants' recollections of their physical activity levels before the COVID-19 lockdown were entirely dependent on them, which makes them potentially inaccurate or overestimated. The online questionnaire used for data collection is prone to recall bias.

Conclusion

The COVID-19 pandemic disrupted all regular human activities which forcefully restrained the students to a limited environment. These forced measures affected the PA patterns of the medical interns to a great extent. Future research using longitudinal study designs and objectively measuring PA before, during, and after additional health crisis-related restrictions is necessary to investigate the potential long-term impact of a health crisis on PA. All students should be encouraged to engage in alternate forms of exercise in case there is another pandemic. Furthermore, suitable assistance ought to be designed to cater to student's living circumstances.

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Declarations

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We have not received any funding from any source to carry out the study.

Author contributions

Conceptualization, B.S. and I.M.; Methodology, I.M. and I.D.; Software, S.P.; Validation, I.M., I.D. and A.S.; Formal Analysis, S.P.; Investigation, R.S.; Resources, I.D. and I.M.; Data Curation, S.P., I.M. and I.D.; Writing – Original Draft Preparation, I.D. and I.M.; Writing – Review & Editing, I.D. and I.M.; Visualization, I.M., and A.S.; Supervision, I.D. and I.M.; Project Administration, A.S., I.D., and I.M.; Funding Acquisition (not applicable).

Conflicts of interest

The authors declare no competing interests.

Data availability

Since it is sensitive data, it can be shared with the journal and reviewers upon request.

Ethics approval

All subjects gave their informed consent for inclusion before they participated in the study. The study was conducted under the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of Kalinga Institute of Medical Sciences (KIIT/KIMS/IEC/684/2021).

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