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Authors' Affiliation:

¹Department of Physiology, College of Medicine, Al-Rayan Colleges, Al-Madinah Al-Monawarah, Saudi Arabia

²College of Medicine, Medical Students, Al-Rayan Colleges, Al-Madinah Al-Monawarah, Saudi Arabia

³Intensive Care Unit Department, King Fahad Hospital, Al-Madinah Al-Monawarah, Saudi Arabia

⁴Internal Medicine Department, King Fahad Hospital, Al-Madinah Al-Monawarah, Saudi Arabia

⁵College of Medicine, Medical Students, Taibah University, Al-Madinah Al-Monawarah, Saudi Arabia

⁶Preventive Medicine Department, Taibah University, Al-Madinah Al-Monawarah, Saudi Arabia

***Corresponding author**

College of Medicine, Medical Students, Al-Rayan Colleges, Al-Madinah Al-Monawarah, Saudi Arabia

Email: lama_sulaiman@outlook.com

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Effectiveness of lifestyle intervention among medical college students at Al-Madinah, Saudi Arabia

Magda Hassanein Metwally Youssef¹, Lama Sulaiman Saad Alahmadi^{2*}, Khalid Waleed Hassan Mahrous³, Smaher Sultan Alhejaili⁴, Nada Mobarek Aljohani⁵, Abdullatif Firas Makhoulou², Yousra Hamid Jaoini², Reem Salamah Alrasheedi⁶

ABSTRACT

Objective: The aim of this study is to identify lifestyle behaviors among medical students as well as the findings of healthy lifestyle before and after the intervention. **Methodology:** The study included both pre-and post-intervention. It was carried out; from October till the end of November 2021. Eight weeks of follow-up and evaluation by researchers guided 360 out of 670 students, both male and female, at Taibah University and Al-Rayan Colleges. **Results:** By the end of the post-intervention, only 266 students had completed the questionnaire. The study showed that the number of students walking increased from 36.5% to 44.7% and those who didn't exercise decreased from 33.1% to 26% ($P=0.033$). Regarding GPA, there was a statistically significant decrease ($P<0.001$) in the number of students with a GPA of 3 to 3.49 (16.8% to 1.6%). Also, there was an increase in GPA from 3.5 to 3.9 (0.0% to 13.7%) and from 4 to 4.49 (31.9% to 33.7%). A significant correlation between exercise and GPA was found pre- and post-intervention, which increased after the intervention ($r =.519$, $P =.04$, $r =.752$, $P =.02$, respectively). Furthermore, fast food consumption decreased after the intervention ($P =.002$) and eating white bread among medical students declined from 74.8% to 66.9% ($P =.045$). **Conclusion:** Lifestyle intervention could assist medical students in adopting a healthy lifestyle that improves their health behaviors, physical activity and academic performance.

Keywords: Lifestyle, intervention, medical college, students.

1. INTRODUCTION

A healthy lifestyle is a great resource for lowering the incidence and impact of health problems, enhancing the ability to deal with life's challenges and enhancing the quality of lifestyle. The rise in obesity worldwide has made lifestyle a prominent cause of disease. Significant modern causes of diseases

include inactivity, poor or excessive eating, smoking, incorrect medication, stress and insufficient sleep (Egger et al., 2011). New and adaptive approaches to health management are needed to deal with these complex factors. Individuals' actions and preferred behaviors make up their lifestyle, which might impact their health. It includes a variety of factors that improve health, such as nutrition, physical activity and health awareness, which contributes to one's health (Lee et al., 2010).

Many studies have shown that college students' dietary and physical activity patterns have improved significantly after nutrition interventions using various techniques and methods for students in college (Ha and Caine-Bish, 2011; You et al., 2009). These programs can be delivered directly to individuals through face-to-face contact in small groups, media-based strategies that cover vast audiences or a mixed approach. Various studies have student volunteers participating in only one or two vital interventions, such as simply educating the intervention's background through information-gathering focus groups or surveys and establishing data collection tools, such as questionnaires, gathering data only, analyzing data only, presenting research findings only or a minimal combination of the former (Boyd et al., 2011; Bulmer et al., 2015; Ganesh et al., 2018; Lopez et al., 2012). Maintaining a healthy lifestyle has various advantages. It suggested that it may aid in preventing chronic illnesses such as cancer, diabetes and heart disease (Ferrara, 2009).

A healthy lifestyle can help one's body maintain good health and shape. Investigating the healthy lifestyle patterns of medical students is essential, considering that they would be engaged in health care in various health settings. They can detect the early signs of risk factors for chronic diseases and improve health decisions in their patient care accordingly (Perrault, 2014). Thus, medical students must be aware of the importance of healthy lifestyles, monitoring their food intake, exercising and managing stress (Al-Drees et al., 2016). Therefore, the present study aims to identify lifestyle behaviors among medical students, as well as the findings of healthy lifestyle before and after the intervention.

2. METHODS

Study design

A pre-post-intervention study was carried out for baseline and follow-up evaluation at male and female medical colleges at Taibah University and Al-Rayan Colleges, Al-Madinah Al-Monawarah, Saudi Arabia. It was carried out; from October till the end of November 2021.

Study population and sampling technique

All medical students, male and female, were invited to participate in the study. An intervention was applied online through an educational workshop concerning physical activity and healthy diet was provided to the students.

Data collection tools and procedures

A self-administered, semi-structured questionnaire using the Validated Canadian School of Natural Nutrition (Perrault, 2014) was used for collecting the data and consists of three parts. The first part: Questions on the socio-demographic information of the participants, such as age, sex, study year for students, marital status, residence (e.g., urban or rural) and grade point average (GPA). The second part: Questions about the practice of physical exercise and the various factors favoring it, the reasons for not practicing and energy level. The third part: Questions on dietary habits like intake of fast food, junk food, soft drinks, dairy products, fruits and vegetables, as well as the amount of water consumed. The researchers distributed the questionnaire to the male and female medical students through their group leader by email.

Intervention

The intervention was held online via Zoom and it included information about the advantages of a healthy lifestyle as healthy diet and regular exercise (frequency, type, duration, fitness). Researchers guided students toward a healthier lifestyle for one hour every week on eight occasions

Data management

Statistical analysis was used and data were coded, entered and analyzed using the Statistical Package for Social Science (SPSS) version 21.0 (SPSS, Chicago, IL, USA). Categorical variables using Chi-squared test. Data is considered significant if ($P < 0.05$).

3. RESULTS

The overall number of students at both colleges was 670, with 360 just responding and sending the questionnaire; by the conclusion of the eighth week, only 266 had completed the post-intervention questionnaire. Their age was 21.78 ±1.42 years, with females accounting for approximately 78.2% and males accounting for 21.8%. Taibah University had 51.5% of the students, while Al-Rayan Colleges had 48.5%. 53.8% of students were in their fifth or sixth academic year, 42.5% in their third or fourth academic year and just 3.8% in their second academic year (Table 1).

Table 1 Personal data of medical students

| Age | Mean ± SD | 21.78 ±1.42 | |
|---------------|-------------------|-------------|---------|
| | | Frequency | Percent |
| Gender | Male | 58 | 21.8 |
| | Female | 208 | 78.2 |
| University | Taibah University | 137 | 51.5 |
| | Al-Rayan Colleges | 129 | 48.5 |
| Academic Year | Second | 10 | 3.8 |
| | Third | 57 | 21.4 |
| | Fourth | 56 | 21.1 |
| | Fifth | 83 | 31.2 |
| | Sixth | 60 | 22.6 |
| Total | | 266 | 100.0 |

The activity results among the sampled participants revealed a significant change in the kind of exercise before and after the intervention (P =.033); walking increased from 36.5% to 44.7%. Multiple exercises climbed from 14.7 to 18.3%; other activities declined from 12 to 5.7% and those who did not exercise decreased from 33.1 to 26%. In terms of exercise time, the percentage of those who practiced for 30 minutes or less climbed from 48.7% to 58.6%, while those who practiced for more than 30 minutes declined from 51.3% to 41.4% (Table 2).

Table 2 Exercise among overall medical students

| | | Intervention | | Chi ² | P value |
|----------|--------------------|--------------|-------------|------------------|---------|
| | | Before | After | | |
| Type | Walking | 97 (36.5%) | 117 (44.7%) | 13.684 | .033* |
| | Running | 9 (3.4%) | 11 (4.2%) | | |
| | Swimming | 1 (0.4%) | 1 (0.4%) | | |
| | Cycling | 0 (0.0%) | 2 (0.8%) | | |
| | Other | 32 (12.0%) | 15 (5.7%) | | |
| | No exercise | 88 (33.1%) | 68 (26.0%) | | |
| | Multiple exercises | 39 (14.7%) | 48 (18.3%) | | |
| Duration | Less than 30 min | 39 (19.6%) | 47 (21.9%) | 4.236 | .120// |
| | 30 min. | 58 (29.1%) | 79 (36.7%) | | |
| | More than 30 min | 102 (51.3%) | 89 (41.4%) | | |

*Statistically significant at 0.05 //Not statistically significant

In a comparative way between both colleges, there was quite a difference between students in each college as per the exercise type, duration and frequency (Table 3); students in Taibah University have shown a more significant improvement in their physical activities, there was a great change in students' attitude towards from not doing sport across 41.6% of them to only 25.5% of students, while in contrast, the philosophy of students in Al-Rayan Colleges towards sports does not differ much before and after. Most exercises were walking, running and multiple sports in both colleges.

Table 3 Exercise among medical students per college

| Sport types | Before | | Chi ² | P value | After | | Chi ² | P value |
|--------------------|-------------------|-------------------|------------------|---------|-------------------|-------------------|------------------|---------|
| | Taibah University | Al-Rayan Colleges | | | Taibah University | Al-Rayan Colleges | | |
| Walking | 44 (32.1%) | 53 (41.1%) | 12.626 | .027* | 70 (51.1%) | 47 (37.6%) | 10.323 | .112// |
| Running | 4 (2.9%) | 5 (3.9%) | | | 2 (1.5%) | 9 (7.2%) | | |
| Swimming | 1 (0.7%) | 0 (0.0%) | | | 1 (0.7%) | 0 (0.0%) | | |
| Cycling | 0 (0.0%) | 0 (0.0%) | | | 1 (0.7%) | 1 (0.8%) | | |
| Other | 17 (12.4%) | 15 (11.6%) | | | 7 (5.1%) | 8 (6.4%) | | |
| No exercise | 57 (41.6%) | 31 (24.0%) | | | 35 (25.5%) | 33 (26.4%) | | |
| Multiple exercises | 14 (10.2%) | 25 (19.4%) | | | 21 (15.3%) | 27 (21.6%) | | |

*Statistically significant at 0.05 //Not statistically significant

In terms of GPA success, there was a significant change ($P < .001$) in most participants GPA (83.5%) after the intervention. The percentage of students with 3 to 3.49 decreased from 16.8% to 1.6%. In addition, their number has increased from 0.0% to 13.7%, with 3.5 to 3.9 (Table 4).

Table 4 GPA among medical students

| What is the level of success (GPA) | Intervention | | Chi ² | P value |
|------------------------------------|--------------|-------------|------------------|---------|
| | Before | After | | |
| Less than 3 | 2 (0.8%) | 3 (1.2%) | 63.904 | <.001** |
| 3 to 3.49 | 40 (16.8%) | 4 (1.6%) | | |
| 3.5 to 3.9 | 0 (0.0%) | 34 (13.7%) | | |
| 4 to 4.49 | 76 (31.9%) | 84 (33.7%) | | |
| 4.5 to 5 | 120 (50.4%) | 124 (49.8%) | | |

**Highly significant at 0.01

Further analysis yielded significant changes in GPA scores among students from each college, especially Al-Rayan Colleges students. It showed reducing the incidence of low GPA scores (3 to 3.49 out of 5) with around 14.7% of the sample before intervention versus 1.6% only after, while it was complementing with an increase in the GPA score between (3.5 to 3.9 out of 5). Compared to Taibah University students, there was a general constant change in GPA scores before and after the intervention, except for a 2.1% decline in scorers between (3 to 3.49 out of 5) before intervention versus 0% after (Table 5). A significant correlation between exercise and GPA was found before the intervention ($r = .519, P = .04$) and became more after the intervention ($r = .752, P = .02$).

Table 5 GPA among medical students per college

| GPA | Before | | Chi ² | P-value | After | | Chi ² | P value |
|-------------|------------|------------|------------------|---------|------------|------------|------------------|---------|
| | University | | | | University | | | |
| | Taibah | Al-Rayan | | | Taibah | Al-Rayan | | |
| Less than 3 | 0 (0.0%) | 2 (0.8%) | 61.18 | <.001** | 0 (0.0%) | 3 (1.2%) | 57.23 | <.001** |
| 3 to 3.49 | 5 (2.1%) | 35 (14.7%) | | | 0 (0.0%) | 4 (1.6%) | | |
| 3.5 to 3.9 | 0 (0.0%) | 0 (0.0%) | | | 6 (2.4%) | 28 (11.2%) | | |
| 4 to 4.49 | 32 (13.4%) | 44 (18.5%) | | | 33 (13.3%) | 51 (20.5%) | | |
| 4.5 to 5 | 93 (39.1%) | 27 (11.3%) | | | 94 (37.8%) | 30 (12.0%) | | |

**Highly significant at 0.01

The eating habits of medical students revealed that those who ate more than three times a day went from 7.9% to 12.8% after the intervention and those who had lunch as the main meal climbed from 54.9% to 62.8%. The intervention reduced the proportion of people who ate dinner from 25.2% to 20.7%. Furthermore, approximately 80% ate snacks; this percentage did not alter significantly before and after the intervention. In terms of the number of times participants ate fast food, those who did not eat fast food

increased from 0% to 4.1% and those who ate fast food once a week increased from 28.6% to 38%. Those who eat fast food twice a week and three times a week decreased from 32.7% to 31.2% and from 34.2% to 23.7% respectively (Table 6).

Table 6 Eating behaviors and frequency among college students

| Variable | Category | Intervention | | Chi ² | P-value |
|--|-----------------------|--------------|-------------|------------------|---------|
| | | Before | After | | |
| How many times a day do you eat? | Less than three times | 151 (56.8%) | 136 (51.1%) | 3.878 | .144// |
| | Three times | 94 (35.3%) | 96 (36.1%) | | |
| | More than three times | 21 (7.9%) | 34 (12.8%) | | |
| Main Meals | Breakfast | 53 (19.9%) | 44 (16.5%) | 3.424 | .180// |
| | Lunch | 146 (54.9%) | 167 (62.8%) | | |
| | Dinner | 67 (25.2%) | 55 (20.7%) | | |
| Snacks | Yes | 215 (80.8%) | 212 (79.7%) | .107 | .744// |
| | No | 51 (19.2%) | 54 (20.3%) | | |
| Times of the day | Less than three times | 231 (86.8%) | 223 (83.8%) | 1.372 | .504// |
| | Three times | 22 (8.3%) | 30 (11.3%) | | |
| | More than three times | 13 (4.9%) | 13 (4.9%) | | |
| How many times a week do you eat fast food | 0 | 0 (0.0%) | 11 (4.1%) | 21.246 | .002** |
| | 1 | 76 (28.6%) | 101 (38.0%) | | |
| | 2 | 87 (32.7%) | 83 (31.2%) | | |
| | 3 | 91 (34.2%) | 63 (23.7%) | | |
| | 4 | 1 (0.4%) | 1 (0.4%) | | |
| | 5 | 1 (0.4%) | 0 (0.0%) | | |
| | 7 | 10 (3.8%) | 7 (2.6%) | | |

**Highly significant at 0.01 // Not statistically significant

Regarding refined food, eating pastries decreased from 74.4% to 72.9% after the intervention and eating white bread decreased significantly (P =.045) from 74.8% to 66.9%, confirming pasta and rice decreased slightly from 85.3% to 83.8% and 81.2% respectively (Table 7).

Table 7 Food nature among college students

| Do you confirm refined foods | | Intervention | | Chi ² | P-value |
|------------------------------|-----|--------------|-------------|------------------|---------|
| | | Before | After | | |
| Pastries | Yes | 198 (74.4%) | 194 (72.9%) | .155 | .694// |
| | No | 68 (25.6%) | 72 (27.1%) | | |
| White bread | Yes | 199 (74.8%) | 178 (66.9%) | 4.015 | .045* |
| | No | 67 (25.2%) | 88 (33.1%) | | |
| Pasta | Yes | 227 (85.3%) | 223 (83.8%) | .231 | .631// |
| | No | 39 (14.7%) | 43 (16.2%) | | |
| Rice | Yes | 227 (85.3%) | 216 (81.2%) | 1.633 | .201// |
| | No | 39 (14.7%) | 50 (18.8%) | | |

*Statistically significant at 0.05 // Not statistically significant

4. DISCUSSION

College life may be an essential target for the promotion of a healthy lifestyle among young adults. This study aimed to enhance knowledge of a nutritious diet and regular exercise while assessing changes in their way of life before and after the intervention. The current study revealed that following the intervention, walking among medical students was increased from 36.5% to 44.7%. In comparison, numerous activities increased from 14.7% to 18.3% (P =.033) and the percentage of students who don't do exercise considerably fell from 33.1% to 26%. However, the duration and frequency of training stayed the same. There was a significant difference between the percentage of students who do exercise in Al-Rayan Colleges pre-intervention, especially in walking,

running and multiple sports and that in the students at Taibah University ($P = .027$). This difference might be caused by the fact that Al-Rayan Colleges have a club and a sports coach who encourage their students to exercise and ongoing tournaments between students from their institution and those from other colleges throughout the year. However, this significant difference was disappeared post-intervention ($P = .112$). This could be due to the increase percentage of the students at Taibah University who participated in exercise and the decrease in the percentage of students who don't exercise from 41.6% to 25.5% ($P = .112$).

The data showed that walking is the most common form of exercise among medical students, which may be a result of a lack of time to participate in sports clubs due to the increased academic load and frequent exams. The improvement in physical activity, as evidenced by the rise in the number of students walking each day particularly in Taibah University, indicates the efficiency of the intervention regarding physical activity among the medical students. It has a real-world effect because doctors who regularly exercise are more likely to advise patients to engage in that activity (Lobelo et al., 2009).

A significant increase in the academic performance among the medical students was observed post-intervention as indicated by the increase in their GPA. Post- intervention, there was a decrease in the number of students having 3 to 3.49 from 16.8% to 1.6% and an increase in their number having 3.5 to 3.9 from 0.0% to 13.7% and from 4.49 from 31.9% to 33.7%, ($P < .001$). Such improvement was more apparent among the students in Al-Rayan Colleges. A significant correlation between exercise and GPA was found before and became more after the intervention ($r = .519$, $P = .04$, $r = .752$, $P = .02$, respectively). These findings demonstrated how physical activity could enhance students' academic performance. It may be due to enhanced cognition and improved brain function and the psychological effects of exercise, which include happiness promotion and stress reduction (Donnelly and Lambourne, 2011; Zain et al., 2021).

The current study's findings align with those of a cross-sectional survey conducted by Al-Drees et al., (2016) who investigated the association between physical activity routines and medical students' GPAs in Saudi Arabia. They showed that physical activity positively correlates with GPA for medical and dental students. Moreover Hou et al., (2020) reported that in addition to physical health, library use and consistent are important factors that affect academic achievement among Chinese Medical and Dentistry students. On the contrary, a recent study in Saudi Arabia reported that academic performance was found to be not affected by physical activity and that the participants' GPA appeared to be similar for both groups who physically active and not. GPA was comparable in both the physically active and inactive groups (Zain et al., 2021).

The improvement of cognition, brain function and academic achievement are all significantly influenced by regular physical activity (Donnelly and Lambourne, 2011); reduced depression and depressive symptoms in young people (Dale et al., 2019) the development and preservation of cognitive health across the lifespan (Bherer and Pothier, 2020); and outstanding mental health support (Dejonge et al., 2020). Improvements in "time on task" and concentration are frequent indicators of how significantly physical activity influences students' involvement in the classroom (Álvarez-Bueno et al., 2017). The primary barriers experienced by students have been identified as exam stress, long study hours, lack of time (Tomy et al., 2019), demotivation and the inability to eat healthily (Yan and Harrington, 2019).

The consumption of fast food among the students was decreased significantly post-intervention. After the intervention, those who did not eat fast food increased from 0% to 4.1% and those who ate fast food once a week increased from 28.6% to 38%. Those who eat fast food twice a week and three times a week decreased from 32.7% to 31.2% and from 34.2% to 23.7%, respectively ($P = .002$). In Riyadh, the average frequency of fast-food consumption was 4.5 times per week among youth (Alzahrani et al., 2020). Medical students consumed fast food due to its accessibility, flavor, convenience and affordability; primarily for taste and to avoid time waste.

This finding is in accordance with a previous Malaysian study which revealed that 73.5% of medical students consumed fast food more than two times per week (Rydell et al., 2008). Also, it is consistent with another study which discovered that all students continue to consume fast food while they are aware that consuming fast food might result in several illnesses and disabilities (Shree et al., 2018). Eating white bread among the medical students decreased significantly from 74.8% to 66.9% ($P = .045$). The consumption of whole grain products is considered to have a beneficial effect on risk reduction of non-communicable diseases (NCD), including cardiovascular diseases, cancers, gastrointestinal disorders and type 2 diabetes (Reynolds et al., 2019). The consuming of dairy products once, 2 to 3 times and 3 to 5 times a week was increased after the intervention in comparison to that before the intervention ($P = .03$).

According to the findings of this study, the Medical College in Al-Rayan Colleges incorporates the Lifestyle Medicine Program in the curriculum of their medical students and this is the role of the university to guide students to balance their academic, rest time and body fitness more scientifically. Raising students' awareness of a healthy lifestyle could help protect them from decreased energy levels and enhance their physical exercise levels.

The limitations of the present study naturally include the sample being selected from only two medical colleges, meaning that the results might only represent some medical students in Saudi Arabia. The data of this study needed to be done in large samples. Therefore, further research should involve a larger sample across different medical colleges. The approach utilized suffers from the limitation that self-reporting methods were used and no verifications were requested for the Student's GPA. The intervention was done online due to the distance during the Covid-19 pandemic. Because of the lack of face-to-face meetings, we decided not to investigate weight; body mass index and other anthropometric measurements were not measured to give more information about the efficiency of the intervention. The limitation of the students' improvement can be attributed to the length of the intervention and the approach used. Thus, the intervention approach can be more effective depending on the intervention approach and its duration.

5. CONCLUSION

The current study shows that an eight-week short-term lifestyle intervention improved some health behavior, physical exercise and increased academic performance. The study's results highlighted how lifestyle intervention could help adopt a healthy lifestyle among medical college students; such educational efforts may lead to healthier lifestyle habits and positive health outcomes.

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Author Contributions

The authors appreciate the contributions of the participants. Authors' contributions: MY carried out the methodology and the manuscript's creation and writing. The LA, KM, SA, NA and AM carried out sample collections. MY and LA directed and participated in the study's planning, statistical analysis and manuscript writing processes. All authors reviewed and approved the final manuscript.

Informed consent

Informed consent was obtained from all individual participants included in the study.

Ethical approval

The official permission was approved by the Scientific Ethical Committee of Taibah University College of Medicine (IRB00010413). Participation was voluntary and online written informed consent from all the participants after describing the aim of the study. Privacy and confidentiality were assured.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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