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Stress, Sleep, and Lifestyle Balance among International Medical Students

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Background	Medical education is widely recognized as one of the most demanding academic programs, exposing students to significant psychological stress and lifestyle challenges. International medical students face additional difficulties including cultural adaptation, language barriers, homesickness, and social isolation, which may adversely affect their stress levels, sleep quality, and lifestyle balance.
Objective	To assess perceived stress, sleep quality, and lifestyle balance among international MBBS students in Kyrgyzstan and examine the relationship between these factors.
Methods	A cross-sectional descriptive study was conducted among 250 international MBBS students at Osh State University. Data were collected using a structured questionnaire comprising socio-demographic information, the Perceived Stress Scale (PSS-10), the Pittsburgh Sleep Quality Index (PSQI), and a lifestyle assessment questionnaire.
Results	60% of participants experienced high perceived stress, 30% moderate stress, and 10% low stress. Poor sleep quality was reported by 90% of students. Higher stress levels were more common among senior-year students due to academic workload, examination pressure, career concerns, and homesickness. High stress was associated with poor sleep quality and unhealthy lifestyle practices.
Conclusion	Stress, sleep quality, and lifestyle are strongly associated among international MBBS students in Kyrgyzstan. These findings highlight the need for targeted interventions including stress management programs, mental health support, sleep hygiene education, and lifestyle promotion initiatives.

Keywords: *International medical students, stress, sleep quality, lifestyle balance, perceived stress, academic stress, psychological well-being, sleep disturbances, healthy lifestyle behaviors, Kyrgyzstan*

1. Introduction

It is generally acknowledged that studying medicine is amongst the most challenging forms of professional education. Studying medicine is associated with acquiring vast theoretical knowledge as well as developing clinical skills under constant academic pressure. Such a situation often results in exposure of students to considerable levels of stress, leading to negative impacts on their physiological state, psychological state, and academic success.

In addition to the above factors, international medical students have to deal with certain difficulties which relate to cultural adaptation, language problems, studying in a foreign educational institution, separation from their families, financial issues, etc. As a result, stress levels may be additionally increased and cause serious problems with adaptation.

Quality sleep plays an important role for maintaining cognitive functions, psychological well-being, immune system functioning, and memory. The National Sleep Foundation claims that adults aged 18–64 need between 7 and 9 hours of sleep per day. However, studies indicate that many medical students suffer from insufficient and/or poor sleep due to heavy academic load, stress before tests, irregular sleep habits, etc. Moreover, lack of good sleep can impair concentration, decrease academic achievement, and lead to the development of anxiety and depression.

A balanced lifestyle that includes physical activity, proper nutrition, sufficient sleep, and effective coping with stress is essential for good health. However, the challenging aspects of being a medical student may cause an imbalance in lifestyle practices such as physical inactivity, unhealthy eating behavior, and spending too much time on screens, which will increase stress and disrupt sleep quality.

Many previous studies have separately reported high stress levels, poor sleep quality, and unhealthy lifestyles among medical students all over the world. However, little has been done concerning assessing the interrelationship between these factors in international medical students learning in Kyrgyzstan. Thus, this study is aimed to investigate stress levels, sleep quality, and lifestyle balance among international medical students and identify the relationship between them.

1.1 Global Burden

The global burden of psychological distress among medical students arises from the high-stress environment associated with studying medicine. Stress in this regard comes from high academic pressure, constant examinations, long study hours, clinical commitments, and career worries. In a systematic review carried out by Dyrbye et al., psychological distress was found to be a problem for medical students compared to their peers in the general population. Therefore, stress is a global public health burden among students pursuing medicine.

Another burden common among medical students is inadequate sleep. Students do not get adequate rest since the study schedule is usually irregular, and most students use gadgets during sleep time. Many students have poor sleep and excessive daytime sleepiness. Burnout has also been increasingly observed among medical students and involves emotional exhaustion, depersonalization, and a decreased feeling of personal accomplishment.

Among the most prevalent psychological problems observed among medical students worldwide are anxiety and depression. Based on their systematic review and meta-analysis, Rotenstein et al. found that around a quarter of medical students experience depressive symptoms while other medical students have clinically significant levels of anxiety.

1.2 International Medical Students

The number of international medical students continues to grow rapidly all over the world. Education in foreign countries opens great prospects for professional development but poses its own challenges that may influence students' mental health, sleeping habits, and general lifestyle. Along with the stresses that come with studying medicine, international students have to face many more obstacles connected with adapting to new conditions, making them very prone to psychological pressure.

Language barriers pose significant challenges despite studies usually being conducted in English. Communication with patients, professors, and members of the host community becomes problematic because of limited vocabulary and lack of knowledge in medical terms, which reduces self-confidence and creates an environment of frustration and detachment.

Cultural adaptation is yet another important aspect. Transitioning from one country to another means getting accustomed to new customs and traditions, and the education system. Differences in teaching

approaches, socializing patterns, and way of life can initially cause anxiety and confusion. In addition, numerous international students suffer from homesickness, which can cause feelings of loneliness, depression, and emotional instability. Financial distress is also a typical stressor; tuition fees, accommodation, transportation, food, and health insurance can put a significant burden on students' finances.

2. Background

2.1 Stress

Stress is a natural physiological and psychological response that occurs when an individual perceives that environmental demands exceed their ability to cope. While short-term stress can improve alertness, concentration, and performance, prolonged or excessive stress may have harmful effects on physical health, mental well-being, and academic achievement.

Types of Stress

Acute stress is a temporary reaction to a stressor that poses immediate danger — such as before exams, presentations, or clinical tests. When the situation is resolved, physiological processes stabilize and return to their usual state. Chronic stress results from long exposure to a stressor that does not provide time for recovery. Students studying medicine may suffer from chronic stress due to academic overload, regular exams, financial problems, poor social connections, and uncertainty regarding career choices. Contrary to acute stress, chronic stress adversely affects physical and psychological well-being and leads to burnout, anxiety, depression, and poor academic results.

Physiology of Stress

The two major physiological mechanisms for responding to stress are the Hypothalamic-Pituitary-Adrenal (HPA) Axis and the Sympathetic Nervous System. On exposure to stress, the hypothalamus secretes CRH, which leads to secretion of ACTH by the anterior pituitary gland, which in turn stimulates the adrenal cortex to secrete cortisol. Cortisol is involved in adaptation to stress through increased availability of blood glucose, enhancement of energy supply, metabolic regulation, and suppression of less critical activities. However, sustained high levels of cortisol can lead to impaired immunity, disrupted sleep, hypertension, obesity, and cognitive issues.

Stress also triggers the sympathetic nervous system, leading to the release of adrenaline and noradrenaline by the adrenal medulla, resulting in the fight-or-flight response. While useful in the short term, continuous sympathetic stimulation inhibits the body's ability to relax sufficiently for adequate sleep and can result in long-term health problems.

2.2 Sleep

Sleep is a fundamental physiological process essential for maintaining physical health, cognitive function, emotional well-being, and overall quality of life. Adequate sleep is necessary for memory consolidation, learning, tissue repair, immune regulation, hormonal balance, and energy conservation. The National Sleep Foundation recommends that healthy young adults obtain 7–9 hours of sleep per night.

Sleep Architecture

Normal sleep consists of two major phases: Non-Rapid Eye Movement (NREM) sleep and Rapid Eye Movement (REM) sleep, which alternate cyclically throughout the night approximately every 90–110 minutes. NREM sleep accounts for nearly 75–80% of total sleep and is divided into three stages (N1, N2, and N3). Stage N3, also known as deep or slow-wave sleep, is essential for physical restoration, tissue

repair, immune function, and growth hormone secretion. REM sleep accounts for approximately 20–25% of total sleep and plays a crucial role in memory consolidation, emotional regulation, learning, and cognitive development.

Circadian Rhythm

Sleep is regulated by the circadian rhythm, an approximately 24-hour biological clock controlled by the suprachiasmatic nucleus (SCN) of the hypothalamus. Light exposure is the primary environmental cue that synchronizes the circadian rhythm by regulating melatonin secretion from the pineal gland. Irregular sleep schedules, late-night studying, and excessive exposure to electronic devices can disrupt circadian rhythms, leading to poor sleep quality and daytime fatigue.

Sleep Deprivation and Its Effects

Sleep deprivation is common among medical students because of the rigorous academic schedule, exams, lengthy hours of studying, and increased use of screens. Sleep deprivation is linked with poor attention span, poor memory, delayed response times, poor judgment, anxiety, depression, obesity, hypertension, diabetes mellitus, and heart disease. Additionally, lack of sleep impacts academic performance through poor concentration, poor learning, and reduced clinical thinking skills.

2.3 Lifestyle Balance

A balanced lifestyle entails ensuring engagement in good behaviors that improve health by providing physical, psychological, emotional, and social benefits. This includes maintaining the right balance between one's academic life, health, recreational activities, and interactions with other people. Healthy lifestyles are especially difficult for medical students owing to the rigorous academic programs they pursue.

Key lifestyle components include: (i) Diet — eating fruits, vegetables, whole foods, lean meats, and staying properly hydrated; (ii) Exercise — the WHO recommends at least 150 minutes of physical activity weekly, which helps decrease cortisol and stimulate endorphin production; (iii) Recreation — activities such as hobbies, meditation, and social activities allow people to relax and reduce burnout; (iv) Time Management — scheduling, goal setting, and avoiding procrastination help reduce academic stress; (v) Social Relationships — supportive relations with family, friends, classmates, and professors are important for psychological health; and (vi) Screen Time management, as excessive screen time before bedtime inhibits melatonin release and disrupts sleep quality.

2.4 Relationship among Stress, Sleep, and Lifestyle Balance

The relationships between stress, sleep, and lifestyle balance are closely interrelated. Any disturbance to one factor may adversely impact the other two. When the organism experiences stress, sustained elevation of cortisol adversely impacts sleep — this hormone makes people less prone to sleep, interferes with deep sleep, and causes nighttime awakenings. Stress also activates the sympathetic nervous system, leading to a state of prolonged arousal that inhibits the ability of the body to relax sufficiently for adequate sleep.

Sleep problems in turn aggravate psychological stress by making it difficult to regulate emotions and think clearly. Individuals who do not get sufficient sleep find it harder to deal with stressful conditions. Healthy personal habits like regular exercise, healthy eating, efficient time management, and social support are very helpful in alleviating stress, improving sleeping patterns, and increasing psychological resilience. Conversely, unhealthy lifestyle choices — physical inactivity, irregular meal consumption, high caffeine intake, overexposure to screens, and improper time management — can increase stress levels and disrupt sleep.

3. Literature Review

In recent decades, there has been a lot of research about the mental health status of medical students across the world. Many studies have shown that medical students suffer more from stress, poor sleep, burnout, anxiety, and depression than students in most other fields of education. It is believed that roughly one out of every three medical students in the world faces at least one major psychological or behavioral issue when studying medicine.

Research conducted by Dyrbye et al. showed that medical students face more emotional stress than their peers in the normal population. Most research studies conducted in the USA focused on the psychological state and the effects of stress of medical students but did not pay much attention to the effects of lifestyles including physical activity, diet, and sleep quality.

In India, several cross-sectional studies have reported academic pressure, competitive exams, economic worries, and extensive studying as some of the main reasons for stress and poor sleep quality among medical students. Researchers concluded that medical students who suffer from insomnia tend to experience high levels of anxiety, fatigue, and poor academic performance. However, the vast majority of Indian literature considered stress and sleep independently without taking into account their association with overall lifestyle healthiness.

Research from China has yielded important data concerning sleep disorders and burnout among medical students. According to the results of a recent systematic review and meta-analysis, sleep problems are extremely common among Chinese medical students and depend on several demographic variables such as geographical location, academic status, and social status.

A number of studies carried out in various European countries have put greater emphasis on protective factors for promoting well-being of students. Systematic reviews have found that participation in regular physical exercise, healthy coping styles, sufficient sleep, social support, and resilience enhance psychological well-being and academic success. Research evidence showing that medical students in the Middle East suffer from a high prevalence rate of stress, burnout, and sleep problems has also been reported. The published scientific evidence about this problem in Kyrgyzstan is scant, making this study particularly relevant.

3.1 Research Gap

While there is a wealth of research into stress, sleep quality, burnout, anxiety, and depression among medical students, several significant limitations are evident. First, most past research has focused on these phenomena separately rather than investigating their interrelated associations. Second, although there is quite a lot of literature on the topic in North America, Europe, China, and the Middle East, very little attention has been paid to international medical students in Central Asia, including Kyrgyzstan.

Third, current studies tend to focus on negative psychological aspects while healthy behaviors such as physical exercise, proper nutrition, efficient time management, and appropriate social relationships — which may serve as protective barriers against stress and poor sleep — have not been fully addressed. There is currently no established evidence on whether there is any relationship between academic stress, poor sleep quality, and lack of lifestyle balance in international students studying at medical universities in Kyrgyzstan.

3.2 Justification of the Study

In recent decades, enrollment of international medical students seeking medical education in Kyrgyzstan has grown tremendously owing to the low cost of tuition, globally acclaimed curriculum, and culturally diverse environment. International medical students face even greater challenges due to adapting to a

new education system, new languages, cultures, money management, and separation from their social and familiar environments.

Studies in other countries indicate that medical students suffer from stress, poor quality of sleep, and lifestyle problems, but not many studies were conducted on international medical students in Kyrgyzstan, and even fewer have explored the interaction between sleep, stress, and lifestyle simultaneously. Understanding such connections is crucial since chronic stress, insufficient rest, and negative health behaviors can affect a person's ability to concentrate, remember information, and feel positive emotions. This study aims to fill that gap and enable universities to implement proper interventions such as psychological support programs, stress reduction courses, and sleep hygiene education.

4. Aim and Objectives

4.1 Aim

To evaluate stress, sleep quality, and lifestyle balance of international medical students in Kyrgyzstan, and to examine the interrelationship among these factors. Secondary aims include identifying factors that contribute to stress and sleep disturbance, providing a scientific basis for further interventions aimed at improving student health and performance.

4.2 General Objective

To determine the levels of stress, sleep quality, and lifestyle balance among international medical students enrolled at universities in Kyrgyzstan, and to find the connection between the selected variables.

4.3 Specific Objectives

- Determine the prevalence and levels of perceived stress among international medical students.
- Identify the quality of sleep and average sleep duration.
- Assess lifestyle balance through analysis of dietary behavior, physical activity, recreational activities, time management, social interaction, and screen time.
- Explore the link between stress levels and sleep quality.
- Examine the connection between stress levels and lifestyle balance.
- Investigate the relationship between sleep quality and lifestyle balance.
- Identify socio-demographic and academic factors influencing these variables (age, gender, year of study, nationality, academic workload).
- Develop effective recommendations for universities and policy-makers on improving mental well-being, sleep quality, and healthy lifestyle among international medical students.

4.4 Hypothesis

There exists a statistically significant relationship between stress, sleep quality, and lifestyle balance among international medical students in Kyrgyzstan. As stress increases, sleep quality decreases and leads to an unhealthy lifestyle. Moreover, socio-demographic and academic factors such as age, gender, year of study, nationality, and workload significantly influence the level of stress, sleep quality, and lifestyle balance.

5. Materials and Methods

5.1 Study Design

A cross-sectional descriptive-analytical survey study design was adopted to investigate stress, sleep quality, and lifestyles among international medical students. This design is suitable for assessing the

frequency or prevalence of these factors in relation to one another at a particular point in time and has been used extensively in medical education literature due to its efficiency and economic advantages.

5.2 Study Setting

The study was conducted at the International Medical Faculty, Osh State University, Osh, Kyrgyz Republic. Osh State University is one of the prominent public medical institutions in the Kyrgyz Republic, offering a 5-year full-time MBBS curriculum in English language accredited by various international medical councils. It accepts students from many countries, particularly from the Indian subcontinent.

5.3 Study Population

Target population comprised Indian students pursuing MBBS at the International Medical Faculty, Osh State University, Kyrgyzstan. The source population comprised all students who were currently enrolled and attending classes across all years of study.

5.4 Inclusion and Exclusion Criteria

Inclusion Criteria:

- Indian international students enrolled in the MBBS course at Osh State University.
- Aged 18 years or above.
- Voluntarily agreed to participate and gave informed consent prior to completing the survey.

Exclusion Criteria:

- Students who refused to participate or filled out incomplete surveys.
- Students who missed class during the period of data collection.
- Students who were academically suspended.

5.5 Sample Size

A total of 250 international medical students participated in this study. All participants were at least 18 years old, covering all five years of the MBBS program. Both males and females participated, with females comprising the majority of respondents (approximately 160 students).

5.6 Data Collection Instruments

A self-completed, well-designed survey instrument prepared in English was used to collect data, comprising four sections:

Section A: Socio-Demographic Characteristics

Age, gender, year of study, place of residence, monthly cost of living, and duration of time spent studying each day.

Section B: Perceived Stress Scale (PSS-10)

Created by Cohen et al., the PSS-10 assesses individuals' perception of stress over the past month using a Likert scale from 0 (never) to 4 (very often).

Section C: Pittsburgh Sleep Quality Index (PSQI)

A well-documented tool assessing sleep quality over the last month across seven areas including duration, latency, efficiency, sleep disturbance, use of sleep medication, daytime dysfunction, and subjective sleep quality. Scores greater than five imply poor sleep quality.

Section D: Lifestyle Assessment Questionnaire

Assessed dietary lifestyle, physical activities, recreational activities, time management, social interaction, and screen-time activities.

6. Results

6.1 Socio-Demographic Characteristics

A total of 250 international medical students participated in the survey, all of whom were aged 18 years or older. Female students constituted the majority of respondents (64.0%, n=160), while male students accounted for 36.0% (n=90). Regarding academic level, 60.0% (n=150) of participants were enrolled in the first three years of the MBBS program, whereas 40.0% (n=100) were studying in the fourth and fifth years.

Table 1. Socio-Demographic Characteristics of Participants (N = 250)

Variable	Frequency (n)	Percentage (%)
Gender		
Female	160	64.0
Male	90	36.0
Age		
≥18 years	250	100
Academic Year		
1st–3rd year students	150	60.0
4th–5th year students	100	40.0

6.2 Perceived Stress Levels

The findings indicate that stress was highly prevalent among international medical students. High stress levels were reported by 60.0% of students, approximately 30.0% experienced moderate stress, while only 10.0% reported low stress levels. Higher stress was predominantly observed among fourth- and fifth-year students, likely due to increased academic responsibilities, clinical training requirements, and concerns regarding the FMGE examination. These findings suggest that academic progression is associated with increasing psychological stress.

Table 2. Perceived Stress Levels Among Participants (N = 250)

Stress Level	Frequency (n)	Percentage (%)
Low	25	10.0
Moderate	75	30.0
High	150	60.0
Total	250	100.0

6.3 Sleep Quality

The results demonstrate that poor sleep quality was highly prevalent, affecting approximately 90.0% of students. Only 10.0% reported good sleep quality. Sleep disturbances were commonly associated with academic workload, examination-related anxiety, irregular study schedules, and homesickness. Poor sleep quality was particularly noticeable among senior students, indicating that increased academic pressure negatively affects sleeping patterns and overall well-being.

Table 3. Sleep Quality Among Participants (N = 250)

Sleep Quality	Frequency (n)	Percentage (%)
Good	25	10.0
Poor	225	90.0
Total	250	100.0

6.4 Lifestyle Balance

The majority of students (60.0%) reported a moderate lifestyle balance, while 20.0% demonstrated a good lifestyle balance and another 20.0% reported poor lifestyle balance. Although most students maintained basic daily routines, several factors negatively influenced lifestyle behaviors, including irregular dietary habits, limited physical activity, prolonged screen time, academic commitments, and adaptation to a foreign environment. Homesickness and separation from family were also frequently reported as contributors to emotional stress and reduced lifestyle satisfaction.

Table 4. Lifestyle Balance Among Participants (N = 250)

Lifestyle Category	Frequency (n)	Percentage (%)
Poor	50	20.0
Moderate	150	60.0
Good	50	20.0
Total	250	100.0

6.5 Association Between Stress, Sleep, and Lifestyle

The findings revealed a clear correlation between stress levels, sleep quality, and healthy lifestyles. Students reporting higher stress levels tended to have poor sleep quality and unhealthy lifestyles. Factors such as homesickness, academic workload, examination stress, and adaptation issues were found to influence this correlation. Conversely, those reporting healthier lifestyles had lower stress levels and better sleep quality. A progressive increase in mean stress scores was also observed across academic years, with first-year students reporting the lowest stress levels and fourth- and fifth-year students reporting the highest.

7. Discussion

In the current research, the levels of stress, sleep quality, and lifestyles of international medical students attending university in Kyrgyzstan were examined, along with the connection between these three factors. The presence of psychological stress and poor quality of sleep were found to be quite high, whereas the lifestyle balance level was quite moderate. Moreover, the research proved a strong connection between high stress levels, poor quality of sleep, and an unhealthy lifestyle.

One of the main findings is the prevalence of stress experienced by 60% of participants, which is consistent with previous research carried out in India, China, the Middle East, Europe, and North America, showing that medical students feel more stressed than those studying other disciplines. The reason behind the stress levels could be the demanding process of studying medicine, encompassing academic

pressures, examination schedules, clinical responsibilities, and career concerns. Stress was experienced more by senior students due to high academic pressure, preparation for licensing exams like FMGE, and concerns about future career prospects.

The research also revealed a very high prevalence of poor sleep quality in participants (approximately 90%), consistent with results from several other international studies. Lack of sleep among medical students could be due to various factors such as excessive studying hours, examination anxiety, irregular sleeping habits, and overuse of gadgets. Poor sleep quality might have an impact on cognitive functions, memory, learning capacity, attention, concentration, and academic success.

More individuals showed lifestyle balance that could be classified as moderate compared to those who showed optimal lifestyles. Even though most students had basic routines to follow daily, there were a number of issues affecting the lifestyle behaviors of some students including poor eating habits, lack of enough exercise, long screen hours, lack of time for recreation, and adaptation problems with new surroundings. International medical students may be particularly vulnerable as a result of living far from their families, different cultural eating behaviors, and lack of social interactions.

One of the important findings is the connection between stress, sleep quality, and balanced lifestyles. The subjects who had higher levels of stress experienced poor sleep quality and engaged in unhealthy lifestyles. Higher stress activates hypothalamic-pituitary-adrenal activity and releases cortisol, which hinders sleep onset. Simultaneously, lack of sleep adversely impacts emotional behavior and makes individuals more sensitive to stress. Likewise, unhealthy lifestyle choices such as physical inactivity, improper nutrition, and too much screen time can aggravate stress and poor sleep quality.

These conclusions are relevant both to medical universities and to policy-makers. Well-developed support programs targeted at effective stress management, counseling for mental health issues, sleep hygiene education, physical exercise, and proper lifestyle can have a positive effect on student well-being. Universities that accept foreign students are expected to improve academic counseling systems, peer mentoring, and cultural adaptation services.

8. Conclusion

This study highlights the substantial burden of psychological stress, poor sleep quality, and lifestyle imbalance among international medical students studying in Kyrgyzstan. The findings revealed that a majority of students experienced high levels of stress and poor sleep quality, while only a small proportion maintained a healthy and balanced lifestyle. Senior students were particularly vulnerable, likely due to increasing academic demands, examination pressures, career-related concerns, and challenges associated with studying abroad.

The study further demonstrated a strong association between stress, sleep quality, and lifestyle behaviors. Students with higher stress levels were more likely to report poor sleep quality and unhealthy lifestyle practices, whereas those who maintained healthier lifestyles tended to experience lower stress levels and better sleep. These findings emphasize the interconnected nature of psychological well-being, sleep health, and daily lifestyle habits among medical students.

As international medical students face additional challenges such as homesickness, cultural adaptation, language barriers, and social isolation, universities must recognize the importance of supporting student well-being beyond academic performance alone. Implementation of comprehensive wellness programs, mental health counseling services, stress-management workshops, sleep hygiene education, and initiatives promoting physical activity and healthy lifestyle behaviors may help improve both health outcomes and academic success.

Addressing stress, sleep disturbances, and lifestyle imbalance should be considered a priority in medical education. Promoting a supportive educational environment and encouraging healthy behavioral practices can contribute to improved quality of life, enhanced academic achievement, and the development of resilient, competent, and healthy future physicians.

Limitations

This research is associated with some limitations. Firstly, the cross-sectional nature of this study implies impossibility of making causal conclusions regarding the relations between the studied variables. Secondly, self-reported questionnaires may suffer from recall bias. Finally, the study was carried out in a single institution and included only international students of one nationality, limiting the representativeness of the sample. Future research should focus on multicenter studies with more diverse samples of international medical students.

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