
Fatigue Syndrome (FS) Prevalence among Saudi Medical Students and Its Association with Depressive and Anxious Symptoms

[Abdulmajeed A. Alkhamees](#)*, [Lamees A. AlGubllan](#)*, [Ahmad H. Alwashmi](#), Deem T. Alamr, Aeshah M. Alharbi, Norah A. Alturaif

Posted Date: 4 April 2024

doi: 10.20944/preprints202404.0379.v1

Keywords: Keywords: Fatigue, Depression, Anxiety, Disease Association, Prevalence, Cross-sectional studies, Young Adult, Disease Severity.



Preprints.org is a free multidiscipline platform providing preprint service that is dedicated to making early versions of research outputs permanently available and citable. Preprints posted at Preprints.org appear in Web of Science, Crossref, Google Scholar, Scilit, Europe PMC.

Copyright: This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Article

Fatigue Syndrome (FS) Prevalence among Saudi Medical Students and Its Association with Depressive and Anxious Symptoms

Abdulmajeed A. Alkhamees ^{1,*}, Lamees Abdulaziz Algubllan ²,
Ahmad H. Alwashmi ³, Deem Tariq Alamr ², Aeshah Menawer Alharbi ² and Norah
Abdullah Alturaif ²

¹ Department of Medicine, Unaizah College of Medicine and Medical Sciences, Qassim University, Buraydah, 52571, Saudi Arabia; Telephone number: +966555139570

² College of Medicine, Unaizah College of Medicine and Medical Sciences, Qassim University, Buraydah, 52571, Saudi Arabia; Lameesalgubllan@gmail.com; +966550609488; DeemTariq@gmail.com, +966534241414; Aishaalsalhi1999@gmail.com, +966509137587; Norah.turaif@gmail.com, +966550176699

³ Department of Orthopedic Surgery, College of Medicine, Qassim University, Buraydah, 52571, Saudi Arabia. a.alwashmi@qu.edu.sa; Tel.: +966551220004

* Correspondence: a.alkhamees@qu.edu.sa

Abstract: Background: Fatigue Syndrome (FS) is described as extreme exhaustion following ordinary activities. Sleep deprivation, the use of antidepressants, autoimmune illnesses, and anemia are also risk factors for FS. Symptoms of FS include headache, dizziness, and dyspnea, among others. **Objective:** This study focused on assessing the prevalence of fatigue syndrome (FS) and its association with depression and anxiety, among the medical students in Saudi Arabia. **Methodology:** In this cross-sectional investigation conducted in 2023, 740 medical students participated. Data were gathered using an online survey, which encompassed four key sections: Sociodemographic details, the 11-item Chalder Fatigue Questionnaire (CFQ), the 9-item Primary Health Questionnaire (PHQ) assessing depression, and the Generalized Anxiety Disorder 7-item (GAD-7) scale. Analyses were performed by the use of SPSS version 25. **Results:** A total of 740 students were surveyed, 417 (56.4%) satisfied the diagnostic requirements for fatigue syndrome (FS), with most of them being females. Furthermore, 234 (31.2%) and 296 (40.8%) of the participants reported having significant anxiety symptoms and depressive symptoms, respectively. FS was positively correlated with symptoms of anxiety and depression ($P < 0.001$). Substance use was negatively correlated with FS, whereas a higher BMI and less physical activity were associated to higher FS scores. **Conclusion:** According to the study, the prevalence of fatigue syndrome is higher among the medical student with female students having higher level than male students. Therefore, in order to avoid consequences fatigue syndrome at later stages, it is crucial to regularly assess, manage, and treat FS among the medical students.

Keywords: Fatigue; Depression; Anxiety; Disease Association; Prevalence; Cross-sectional studies; Young Adult; Disease Severity

1. Introduction

Fatigue syndrome (FS) is defined as abnormal exhaustion after engaging in regular activities. The syndrome is associated with both physical and mental health problems. Physical health issues include anemia, autoimmune diseases, and chronic obstructive pulmonary disease while mental health issues associated with fatigue include; physical strain, sleep deprivation, antidepressant use. Other health issues associated with this syndrome include; headache, dizziness, dyspnea, and increased number of suicide cases [1].

Globally, different populations experience fatigue syndrome at different rates. There are usually sub-group in a population where fatigue is more common. In Brazil, the prevalence of fatigue among the adult in the general population was found to be 11.9%, with 8.5% of men and 14.9% of women experiencing it [2]. On the other hand, the Australian Medical Association discovered that, of 716 doctors, 53% were more likely to experience fatigue while performing their duties [3]. Moreover, another study noted that about 85% of patients with head and neck cancer reported feeling more tired [4]. Furthermore, fatigue was a common issue for college students, especially those taking health-related courses [5].

People today often experience stress due to the level of physical exhaustion, an overwhelming mental workload, depression, and irritability. In addition to the symptom causing enormous tragedies to the families, the unexpected death brought on by chronic fatigue has detrimental effects on social production [6]. Among the students, there are several factors that contribute to fatigue syndrome, including the amount of work they are engaged in, level of competition, frequent evaluations tests, and peer pressure [7]. Further, it is noted that the level of fatigue experienced by the students during an ongoing semester session and at the end of semester is based on the level of depression experienced during the semester session which also affects their functioning and health of affected students [8]. Medical students are not immune to the disorder; in fact, their risk is higher than that of the general student population, which has a significant impact on their quality of life and in health sector at large [9]. Therefore, it is important to comprehend the prevalence of fatigue and the factors associated with it in order to reduce the possibility of detrimental health effects among the medical students. Although similar or related studies have been carried out in Saudi Arabia, none of the recent studies has focused on all medical student in the general population in Saudi Arabia. Given the existing knowledge gaps, this research sought to assess the prevalence of fatigue syndrome (FS) and its association with depression and anxiety, among the medical students in Saudi Arabia.

2. Materials and Methods

Study Design and Setting

An observational descriptive cross-sectional study was conducted from February to July 2023. Its objectives were to estimate the prevalence of fatigue syndrome (FS) and its association with depression and anxiety, among the medical students in Saudi Arabia.

2.1. Sampling

Using the Raosoft website, with an estimated population of 26,216, a 95% confidence level, a standard deviation of 0.5, and a margin of error of 5%, the required sample size was determined to be 379. Nevertheless, 740 medical students aged above 18 residing in Saudi Arabia participated by completing the online questionnaire.

2.2. Data Collection

An online survey was chosen for its convenience and to maximize student participation. The survey questionnaire was designed on the Google Forms platform and disseminated through email and social media platforms such as WhatsApp, telegram to the selected medical students in various medical colleges nationwide. Ethical clearance was obtained from the Research Ethics Committee of Qassim University, Saudi Arabia (Approval No.23-30-07). The participants filled in the survey questionnaire after receiving informed electronic consent. They were assured of confidentiality and given the freedom to opt-out at any stage.

The information consisted in the questionnaire used included:

Socio-demographic Information:

Age, height, weight, Nationality, academic year, marital status, Substance and tobacco use, daily exercise routine, gender.

Chalder Fatigue Questionnaire (CFQ):

It was created by Chalder et al., in 1993, this 11-item questionnaire, validated for the Brazilian primary

care setting, measures both psychological and physical fatigue experienced over the past 6 months. Scoring is based on a 4-point Likert scale, ranging from 0 (less than usual) to 3 (much more than usual), the cut-off score for fatigue diagnosis is 22 [10].

9-item Primary Health Questionnaire (PHQ):

This was translated and validated by AlHadi et al., it gauges depression symptoms over the last 2 weeks. Its total score spans from 0 to 27, with a diagnostic cut-off of 10 for depression [11].

GAD-7 Questionnaire:

Also validated and translated by AlHadi et al., this instrument evaluates anxiety symptoms in the preceding 2 weeks. The scoring threshold for diagnosing anxiety is 10 [11].

Data Analysis:

Analysis was executed using SPSS version 25.0. Descriptive statistics assessed the prevalence of fatigue syndrome with qualitative results presented as numbers and percentages (N & %) and quantitative results as mean and standard deviation (mean+/-SD). To explore the association between fatigue syndrome (FS) and depression and anxiety, four simple linear regressions and the Chi-square test were utilized. Differences in (FS) across demographic categories were analyzed through an independent sample t-test, Pearson's correlation, a one-way ANOVA, and Spearman's rho correlation.

3. Results

As represented in (Table 1) 740 medical students agreed to participate in this study. The proportion of female students 516 (69.7%) was significantly higher compared to male students 224 (30.3%). Most of the participants were between 18-24 years old 610 (82.4%). The proportion of Saudi students 687 (92.8%) in the study outnumbered the non-Saudis 53 (7.2%), and 160 (21.6%) studied at Qassim University. The fifth-year medical students were 187 (25.5%) and were the highest out of all the academic years, followed by sixth year 139 (18.8%). Moreover, most of the participants 708 (95.7%) were single. In addition, most of the respondents 618 (83.5%) had never smoked before, 719 (97.2%) had never used substance before, 259 (35%) were not doing exercises, 249 (45.9%) exercised by walking and 343 (52.4%) had normal weight.

Table 1. Descriptive Analysis on the Sociodemographic information of the Sample (N = 740).

	<i>n</i>	%
Gender		
Male	224	30.3
Female	516	69.7
Age		
18-24 years	610	82.4
25-30 years	119	16.1
31-35 years	7	0.9
41-45 years	2	0.3
More than 45 years	2	0.3
Nationality		
Non-Saudi	53	7.2
Saudi	687	92.8
University*		
Qassim University	160	21.6
Taibah University	75	10.1
Sulaiman Al Rajhi University	52	7.0
King Khalid University	50	6.8
King Abdulaziz University	47	6.4
Academic year		
1st year	60	8.1
2nd year	73	9.9
3rd year	92	12.4
4th year	129	17.4

5th year	189	25.5
6th year	139	18.8
Intern	58	7.8
Marital status		
Single	708	95.7
Married	30	4.1
Divorced	2	.3
Smoking		
No, I never smoked before	618	83.5
Yes	72	9.7
No, but I used to	50	6.8
Substance use		
Yes	9	1.2
No, but I used to	12	1.6
No, I never used before	719	97.2
Exercise frequency		
Never do exercise	259	35.0
Once per week	204	27.6
2-3 times per week	142	19.2
4-5 times per week	93	12.6
More than 5 times per week	42	5.7
Exercise type*		
Walking	249	45.9
Walking, running	44	8.1
Weightlifting	39	7.2
Walking, weightlifting	35	6.5
Walking, jogging	20	3.7
BMI Classification		
Underweight	113	17.3
Normal weight	343	52.4
Overweight	123	18.8
Obese	76	11.6

*The top 5 universities are displayed. *The top 5 exercise types are displayed. BMI= body mass index.

The data collected revealed that there was a significant difference between women ($M=1.40$, $SD=0.63$) and men ($M=1.20$, $SD=0.60$) ($P<0.05$). (See Supplementary Figure 1).

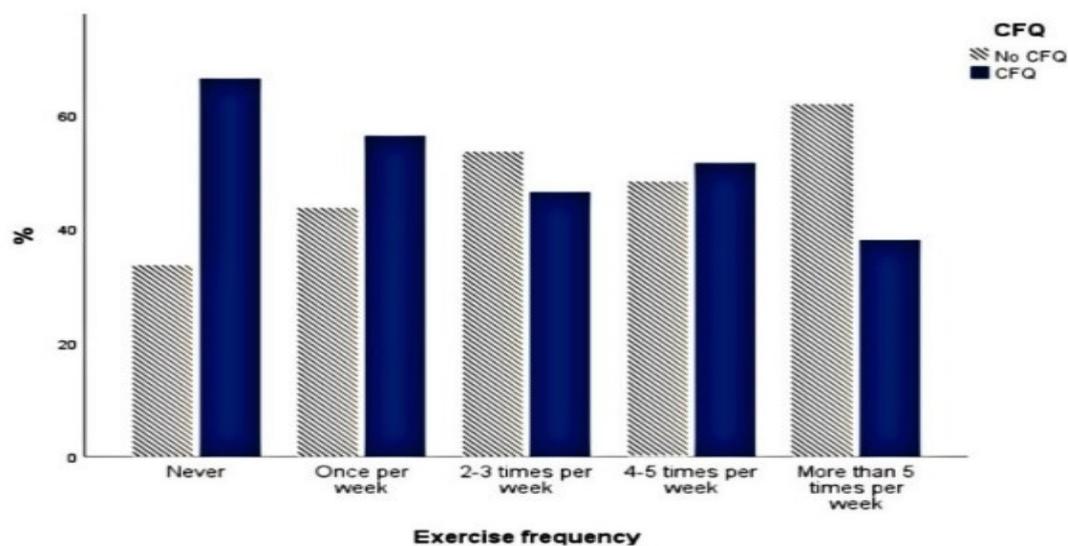


Figure 1. Contingencies on the Relationship between Fatigue Syndrome (FS) and Exercise Frequency (N = 740).

However, the results showed a statistically significant relationship between fatigue syndrome and height indicating that shorter students experience greater scores. And there was a statistically significant relationship between fatigue syndrome (FS) and weight indicating obese students reported a higher score than normal weight and obese students. A statistically significant difference between obese and normal weight students ($p=0.041$). As well as between obese and overweight students ($p = 0.039$). (Table 1 & supplementary Figure 2).

Depression prevalence

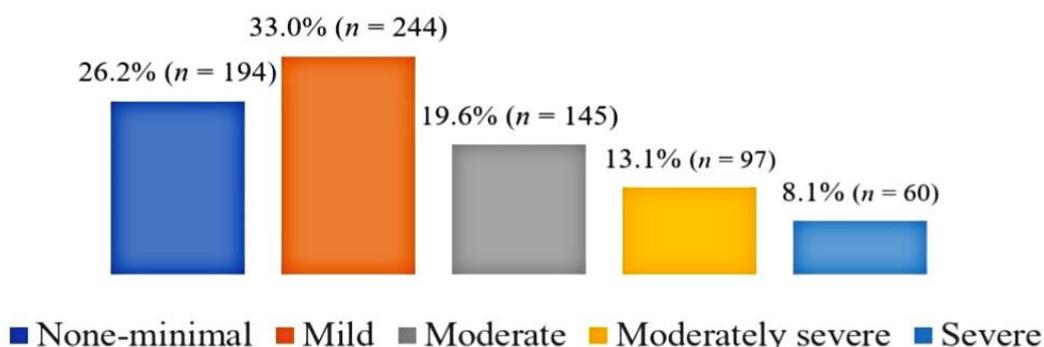


Figure 2. Frequency Analysis on Prevalence of Depression.

Besides, a statistically significant difference was identified between students who use substances and those who have never used substances. Students who used substances experienced a lower score than those who had never used substances before and those who are not using substances but used to. (Supplementary Figure 3).

Anxiety prevalence

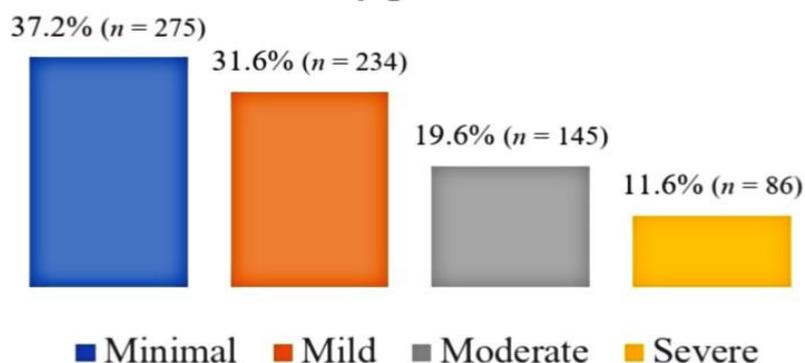


Figure 3. Prevalence of Anxiety.

Furthermore, the association between fatigue syndrome (FS) and exercise frequency was evaluated which indicated a statistically significant negative weak relationship ($P<0.05$). This means that individuals who exercise more frequently experience lower scores. (Table 2 & Figure 1).

Table 2. Contingencies on the Relationship between Fatigue Syndrome (FS) and Exercise Frequency (N = 740).

	Exercise frequency				
	Never	Once/week	2-3 times/week	4-5 times/week	> 5 times/week
No FS	26.9%	27.6%	23.5%	13.9%	8.0%
FS	41.2%	27.6%	15.8%	11.5%	3.8%

3.1. Prevalence of Fatigue Syndrome

A descriptive analysis was performed to assess the prevalence of fatigue syndrome (FS) (N = 740). Overall, 56.4% ($n = 417$) of the individuals met the fatigue syndrome (FS) diagnostic criteria, while 43.6% were not ($n = 323$). Descriptive and frequency analysis on fatigue syndrome (FS) prevalence (see supplementary Table 1 descriptive analysis; supplementary Table 2 for frequency analysis).

3.2. Depression and Anxiety Prevalence

A frequency analysis was performed to assess the prevalence of depression and anxiety. (See Figure 2 & 3 for frequency analysis).

3.3. Hypothesis Testing

3.3.1. H_{1a} to H_{1b}

A simple linear regression analysis was conducted to evaluate if fatigue syndrome (FS) was a statistically significant predictor of depression (N = 740) (H_{1a}). The analysis showed a statistically significant model, $F(1, 738) = 629.01, p < .001$, which accounted for 45.9% of the variance in depression, ($R^2 = .460$; $R^2_{adj.} = .459$). Fatigue syndrome (FS) was a statistically significant positive predictor of depression, indicating that individuals with higher FS scores are more likely to experience greater depression (see Table 3 for regression coefficients).

Table 3. Simple Linear Regression study of Depression and Anxiety as the Outcome Variable and Fatigue Syndrome (FS) as the Predictor Variable (N = 740).

Depression					
Variable	B (95% CI)	SE _B	β	t	p
Constant	-0.05(-0.14, 0.05)	0.05		-0.97	.33
Fatigue Syndrome (FS)	0.80(0.74, 0.86)	0.03	0.68	25.08	< .001
Anxiety					
Constant	0.10(-0.01, 0.22)	0.06		1.75	.080
Fatigue Syndrome (FS)	0.70(0.62, 0.78)	0.04	0.54	17.55	< .001

Note. B = unstandardized regression coefficient; CI = confidence interval; SE_B = standard error of unstandardized regression coefficient; β = standardized regression coefficient.

Also, a simple linear regression analysis was performed to evaluate if fatigue syndrome (FS) was a statistically significant predictor of the impact of depression on everyday life (N = 740) (H_{1b}). A statistically significant model was identified, $F(1, 738) = 421.44, p < .001$, which accounted for 36.3% of the variance in the impact of depression on everyday life, ($R^2 = .363$; $R^2_{adj.} = .363$). Fatigue syndrome (FS) was a statistically significant positive predictor of the impact of depression on everyday life, suggesting that individuals with higher FS Scores are more likely to experience a greater impact of depression on their everyday life (see Table 4 for regression coefficients).

Table 4. Simple Linear Regression with the Impact of Depression/Anxiety on Everyday Life as the Outcome Variable and CFQ as the Predictor Variable (N = 740).

Depression					
Variable	B(95% CI)	SE _B	β	t	p
Constant	-0.15(-0.28, -0.03)	0.06		-2.41	.016
FS	0.87(0.79, 0.96)	0.04	0.60	20.53	<.001
Anxiety					
Constant	-0.02	0.07		-0.30	.77
FS	0.75	0.05	0.52	16.36	.75

Note. B = unstandardized regression coefficient; CI = confidence interval; SE_B = standard error of unstandardized regression coefficient; β = standardized regression coefficient.

3.3.2. H₂

A chi-square test of association was conducted to assess if there was a statistically significant relationship between fatigue syndrome (FS) and depression (N = 740). The analysis indicated a statistically significant relationship, $\chi^2(4) = 195.66, p < .001$, Cramer's $V = 0.51$. Relationships between fatigue syndrome (FS) and depression (see Table 5 & Figure 4 for contingencies).

Table 5. Contingencies on the Relationship between Fatigue Syndrome (FS) on Depression and Anxiety (N = 740).

	Depression				
	None-minimal	Mild	Moderate	Moderately severe	Severe
No (FS)	46.1%	39.0%	9.6%	5.3%	0.0%
FS	10.8%	28.3%	27.3%	19.2%	14.4%
	Anxiety				
	None-minimal	Mild	Moderate	Moderately severe	
No FS	56.0%	31.9%	9.0%	3.1%	
FS	22.5%	31.4%	27.8%	18.2%	

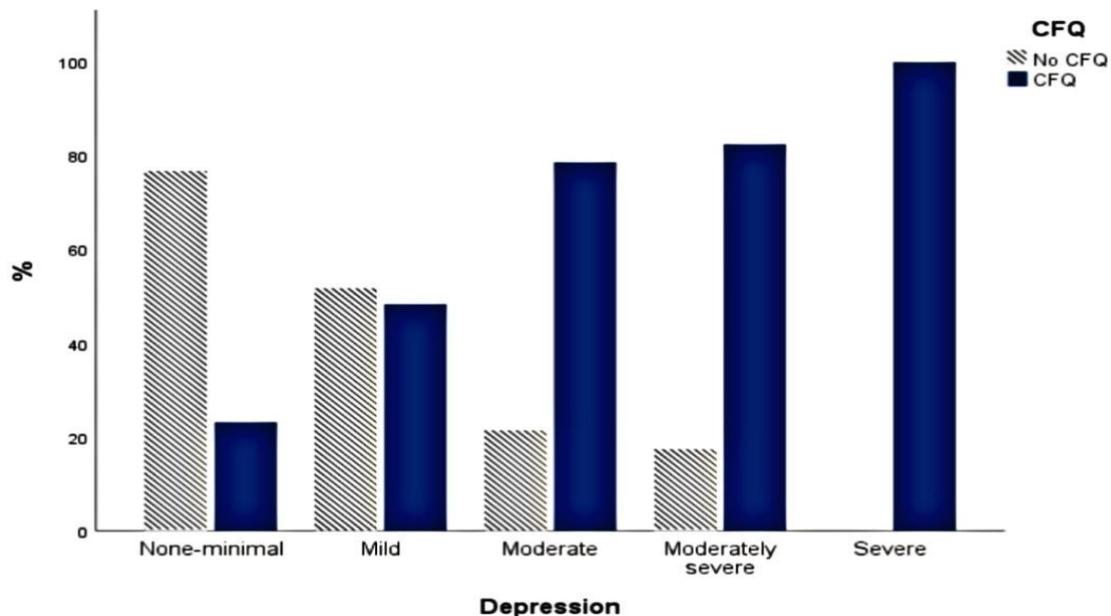


Figure 4. Contingencies on the Relationship between FS Scores and Depression (N = 740).

3.3.3. H_{3a} to H_{3b}

A simple linear regression analysis was conducted to evaluate if fatigue syndrome (FS) was a statistically significant predictor of anxiety (N = 740) (H_{2a}). The analysis showed a statistically significant model, $F(1, 738) = 307.92, p < .001$, which accounted for 29.3% of the variance in anxiety, ($R^2 = .294$; $R^2_{adj.} = .293$). Fatigue syndrome (FS) was a statistically significant positive predictor of anxiety, indicating that individuals with higher FS score are more likely to experience greater anxiety (see Table 3 for regression coefficients).

Furthermore, a simple linear regression analysis was performed to evaluate if fatigue syndrome (FS) was a statistically significant predictor of the impact of anxiety on everyday life (N = 740) (H_{1b}). A statistically significant model was identified, $F(1, 738) = 267.69, p < .001$, which accounted for 26.5% of the variance in the impact of anxiety on everyday life, ($R^2 = .266$; $R^2_{adj.} = .265$). Fatigue syndrome (FS) was a statistically significant positive predictor of the impact of anxiety on everyday life, suggesting that individuals with higher FS Score are more likely to experience a greater impact of anxiety in their everyday life (see Table 4 for regression coefficients).

3.3.4. H₄

A chi-square test of association was performed to evaluate if there was a statistically significant relationship between fatigue syndrome (FS) and anxiety (N = 740). A statistically significant relationship was identified, $\chi^2 (3) = 123.78, p < .001$, Cramer's $V = 0.41$. Reaction between fatigue syndrome (FS) and anxiety (see Table 5 & Figure 5 for contingencies).

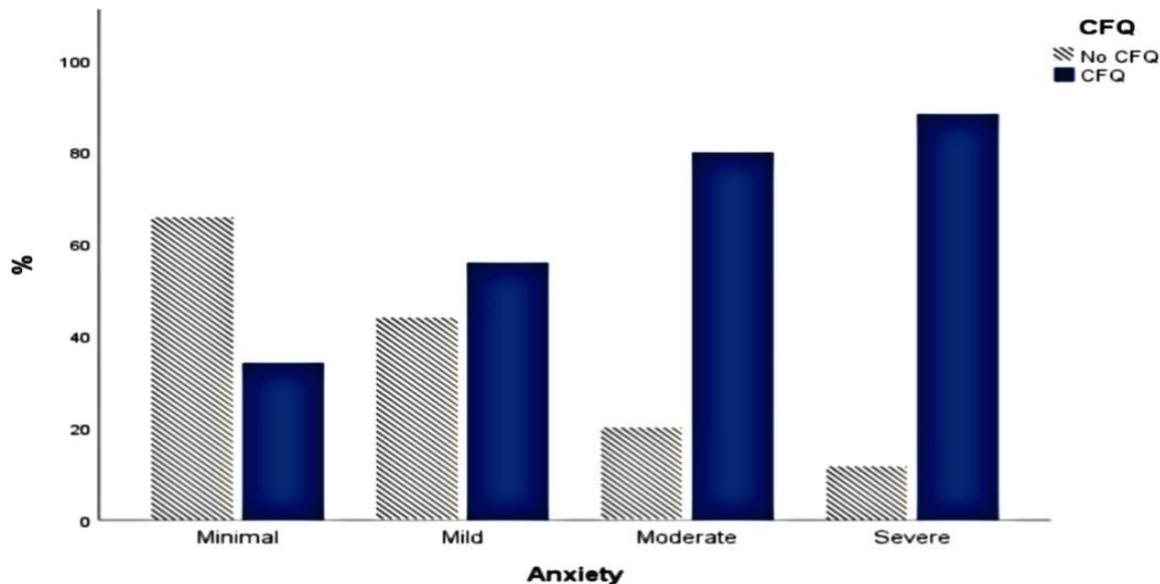


Figure 5. Contingencies on the Relationship between Fatigue Syndrome (FS) Scores and Anxiety (N = 740).

4. Discussion

This study was focused on evaluating the prevalence of fatigue syndrome (FS) and its association with depression and anxiety, among the medical students in Saudi Arabia. The study revealed that among the (N = 740) participants who met the fatigue syndrome (FS) diagnostic criteria. The prevalence of fatigue syndrome (FS) was 56.4% ($n = 417$), indicating majority of respondent had fatigue syndrome. The study also found a statistically significant difference between female and male medical students who had FS ($P < 0.001$) with female students having higher number 516 (69.7%) compared to male students 224 (30.3%). In addition, the study found a statistically significant relationship between fatigue syndrome and height, weight as well as students with obese ($p < 0.001$). This indicates that shorter students' experienced greater FS scores compare tall students. On the other hand, overweight and obese students reported a higher FS score than normal weight students. The study by Pokhrel et al., also indicated a statistically significantly between anxiety, depression and presence of FS with the syndrome prevailing more among the female gender [12].

Besides, a statistically significant difference was identified between students who use substances and those who have never used substances. Students who used substances experienced a lower score than those who had never used substances before and those who are not using substances but used to. Furthermore, the association between fatigue syndrome (FS) and exercise frequency was evaluated which indicated a statistically significant negative weak relationship ($P < 0.001$). This means that individuals who exercise more frequently experience lower FS scores. This findings were also revealed in a study by Valladares-Garrido et al., where Anxiety (PR: 1.27), depression (PR: 1.35), and stress (PR: 1.31), among other symptoms, were found to be more common in students with eating behavior disorders [13].

The regression analysis showed a statistically significant relationship between FS and depression, $F (1, 738) = 629.01, p < .001$, which accounted for 45.9% of the variance in depression, ($R^2 = .460$; $R^2_{adj} = .459$). Fatigue syndrome (FS) was a statistically significant positive predictor of depression, indicating that individuals with higher FS scores are more likely to experience greater depression. This findings were in line with results obtained in a study by Obeid et al., which noted

that higher FS scores were linked to individual with psychological difficulties (Beta = 5.547; CI 4.430–6.663) and distress (Beta = 7.455; CI 5.945–8.965) than to individuals who their level of wellbeing is high [14].

Further, the regression analysis indicated that FS is the predictor of the impact of depression on everyday life. The association was statistically significant $F(1, 738) = 421.44, p < .001$, indicating that FS accounted for 36.3% of the variance in the impact of depression on everyday life, ($R^2 = .363; R^2_{adj.} = .363$). This suggest that individuals with higher FS Scores are more likely to experience greater impact of depression on their everyday life. In consistence to the finding obtained in a study by Hou et al., the prevalence of FS among the health care workers was reported to be 56.7% with a number healthcare workers with FS being noted to have higher level of depression and anxiety oftenly [15]. The Chi-square test also indicated a statistically significant relationship between fatigue syndrome (FS) and depression, $\chi^2(4) = 195.66, p < .001$, Cramer's $V = 0.51$. In a study by Luo et al., the results from univariate analysis indicated that the level of fatigue syndrome among the university students surveyed was based on the sleep quality, anxiety, depression, study habits, alcohol use, exercise, and overnight stays. This association was found to statistically significant ($P < 0.001$) [16].

The regression analysis further showed a statistically significant relationship between Fatigue syndrome (FS) and individual with anxiety, $F(1, 738) = 307.92, p < .001$, indicating that FS accounted for 29.3% of the variance in anxiety, ($R^2 = .294; R^2_{adj.} = .293$). This suggest that individuals with higher FS score are more likely to experience greater anxiety. Al Hourri et al., also indicated in their study that among the undergraduate medical students surveyed, most of the anxiety reported was connected to their studies. Among participants, most of them had moderate stress levels (37.0%; $n = 545$) and mild stress levels (50.6%; $n = 745$) [17].

Furthermore, the linear regression analysis showed that fatigue syndrome (FS) is the predictor of the impact of anxiety on everyday life. The association was statistically significant, $F(1, 738) = 267.69, p < .001$, indicating that FS accounted for 26.5% of the variance in the impact of anxiety on everyday life, ($R^2 = .266; R^2_{adj.} = .265$). This suggest that individuals with higher FS Score are more likely to experience a greater impact of anxiety in their everyday life. The study by Sacramento et al., indicated that among the FS group, anxiety symptoms were present in 30.8% of cases, while depression symptoms were present in 36.0%. There was a statistically significant correlation between gender, age, and sexual orientation and the crude and adjusted PR for anxiety symptoms. Gender, ethnicity/skin color, and sexual orientation were statistically significantly correlated with the crude and adjusted PR for depressive symptoms [18]. The Chi-square test of the association between fatigue syndrome (FS) and anxiety also showed a statistically significant relationship, $\chi^2(3) = 123.78, p < .001$, Cramer's $V = 0.41$. Based on another study conducted among health sciences undergraduate students, a number of stress cases (74.6%) and depression cases (66.2%) were normal-to-mild levels. On the other hand, 74.6% of them had moderate-to-extremely severe anxiety. The correlation between the year of study and the stress score were statistically significant. Based on their findings, low-grade fever and recurrent headaches were risk factors for stress and anxiety, while exhaustion and poor sleep quality were risk factors for anxiety and depression [19].

The study had some limitations, therefore, care should be taken when interpreting the results. The temporal relationship between the exposures and outcomes could not be established due to the use of a cross-sectional research design. So, longitudinal studies should be taken into consideration by future researchers. The results could have been impacted by social desirability and memory recall biases resulting from the self-reporting mechanism in the questionnaire. This may be enhanced in subsequent research by adding comprehensive diagnostic questionnaires to the evaluation. Furthermore, a general study of Saudi medical students was conducted. Scoping the future research based on the medical program and its departments would give special characteristics that shape students' viewpoints. So, a single-centered study that assesses the degree of fatigue syndrome according to the medical curriculum would help in understanding the level of FS among medical students in Saudi better.

5. Conclusion

In summary, the study revealed that most of the participants surveyed fulfilled the diagnostic criteria for fatigue syndrome (FS), indicating a high prevalence of FS among Saudi Arabian medical students. Compared to male pupils, female students had a higher likelihood of having FS. Moreover, FS and height and weight were significantly correlated. On the other hand, the use of substance was associated with higher scores for fatigue syndrome (FS), while more frequent exercise was associated with lower FS scores. The study also noted a significant correlation between substance use, frequency exercise and prevalence of FS. Moreover, higher FS scores was revealed to be the contributing factor to the higher levels of anxiety and depression among the medical students. Hence, FS is a significant predictor of both depression and anxiety. Therefore, because FS has a substantial impact on mental health and daily functioning, this study emphasizes the need of evaluating, treating and managing FS among medical students to avoid the implication of the syndrome in the advanced stages.

Supplementary Materials: The following supporting information can be downloaded at the website of this paper posted on Preprints.org.

Funding: Researchers would like to thank the Deanship of Scientific Research, Qassim University for funding publication of this project.

Institutional Review Board Statement: The formal ethical approval was obtained from the Research Ethics Committee of Qassim University, Saudi Arabia (Approval No.23-30-07). Participants only fill the survey after providing informed electronic consent. They were assured of confidentiality and given the freedom to opt-out at any stage.

Data availability: The data that support the findings of this study are available on request from the corresponding author.

Acknowledgments: The authors appreciate all participants and data collectors for their efforts in facilitating the work of the study.

Conflicts of interest: There were no reported conflicts of interest by the authors.

References

1. Liu S, Xi HT, Zhu QQ, Ji M, Zhang H, Yang BX, Bai W, Cai H, Zhao YJ, Chen L, Ge ZM. The prevalence of fatigue among Chinese nursing students in post-COVID-19 era. *PeerJ*. 2021 Apr 13; 9:e11154.
2. Wendt A, Costa CS, Machado AK, Costa FS, Neves RG, Flores TR, Santos I, Wehrmeister FC. Sleep disturbances and daytime fatigue: data from the Brazilian National Health Survey, 2013. *Cadernos de saude publica*. 2019 Mar 11; 35.
3. Australian Medical Association. 2017 public hospital report card.
4. Bossi P, Di Pede P, Guglielmo M, Granata R, Alfieri S, Iacovelli NA, Orlandi E, Guzzo M, Bianchi R, Ferella L, Infante G. Prevalence of fatigue in head and neck cancer survivors. *Annals of Otolaryngology, Rhinology & Laryngology*. 2019 May; 128(5):413-9.
5. Zhu H, Han G. Chronic Fatigue Stress and Sudden Death. *Sudden Death: Advances in Diagnosis and Treatment*. 2021:117-35.
6. Shim EJ, Noh HL, Yoon J, Mun HS, Hahm BJ. A longitudinal analysis of the relationships among daytime dysfunction, fatigue, and depression in college students. *Journal of American college health*. 2019 Jan 2; 67(1):51-8.
7. Aziz F, Khan MF. Association of Academic Stress, acne symptoms and other physical symptoms in medical students of King Khalid University. *International Journal of Environmental Research and Public Health*. 2022 Jul 18; 19(14):8725.
8. Pallant A, Sullivan T, Kaluzny A. Nutritional deficiency presenting as acute pain, fatigue and bruising in a college health clinic. *Journal of American College Health*. 2022 Apr 3; 70(3):670-2.
9. Alothman OM, Alotaibi YM, Alayed SI, Aldakhil SK, Alshehri MA. Prevalence of Depression among Resident Doctors in King Fahad Medical City, Riyadh, Saudi Arabia. *Int J Pharm Res Allied Sci*. 2020 Jul 1; 9(3):81-6.
10. Chalder T, Berelowitz G, Pawlikowska T, Watts L, Wessely S, Wright D, Wallace EP. Development of a fatigue scale. *Journal of psychosomatic research*. 1993 Feb 1; 37(2):147-53.
11. AlHadi AN, AlAteeq DA, Al-Sharif E, Bawazeer HM, Alanazi H, AlShomrani AT, Shuqdar RM, AlOwaybil R. An arabic translation, reliability, and validation of Patient Health Questionnaire in a Saudi sample. *Annals of general psychiatry*. 2017 Dec; 16 (1):1-9.
12. Pokhrel NB, Khadayat R, Tulachan P. Depression, anxiety, and burnout among medical students and residents of a medical school in Nepal: a cross-sectional study. *BMC psychiatry*. 2020 Dec; 20(1):1-8.

13. Valladares-Garrido D, Quiroga-Castañeda PP, Berrios-Villegas I, Zila-Velasque JP, Anchay-Zuloeta C, Chumán-Sánchez M, Vera-Ponce VJ, Pereira-Victorio CJ, Failoc-Rojas VE, Díaz-Vélez C, Valladares-Garrido MJ. Depression, anxiety, and stress in medical students in Peru: a cross-sectional study. *Frontiers in Psychiatry*. 2023; 14.
14. Obeid S, Akel M, Haddad C, Fares K, Sacre H, Salameh P, Hallit S. Factors associated with alcohol use disorder: the role of depression, anxiety, stress, alexithymia and work fatigue-a population study in Lebanon. *BMC public health*. 2020 Dec; 20(1):1-1.
15. Hou T, Zhang R, Song X, Zhang F, Cai W, Liu Y, Dong W, Deng G. Self-efficacy and fatigue among non-frontline health care workers during COVID-19 outbreak: A moderated mediation model of posttraumatic stress disorder symptoms and negative coping. *PloS one*. 2020 Dec 10; 15(12):e0243884.
16. Luo L, Zhang Y, Huang T, Zhou F, Xiong C, Liu Y, Zhai P, Wang G, Tan J, Jiao C, Chen X. A description of the current status of chronic fatigue syndrome and associated factors among university students in Wuhan, China. *Frontiers in Psychiatry*. 2023 Jan 12; 13:1047014.
17. Al Hourri HN, Jomaa S, Arrouk DM, Nassif T, Al Ata Allah MJ, Al Hourri AN, Latifeh Y. The prevalence of stress among medical students in Syria and its association with social support: a cross-sectional study. *BMC psychiatry*. 2023 Dec; 23(1):1-3.
18. Sacramento BO, Anjos TL, Barbosa AG, Tavares CF, Dias JP. Symptoms of anxiety and depression among medical students: study of prevalence and associated factors. *Revista Brasileira de Educação Médica*. 2021 Feb 3; 45.
19. Fauzi MF, Anuar TS, Teh LK, Lim WF, James RJ, Ahmad R, Mohamed M, Abu Bakar SH, Mohd Yusof FZ, Salleh MZ. Stress, anxiety and depression among a cohort of health sciences undergraduate students: the prevalence and risk factors. *International journal of environmental research and public health*. 2021 Mar 22; 18(6):3269.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.