BMC Health Services Research

RESEARCH

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Work-life balance and health among pharmacists: physical activity, sleep quality, and general health

Esmaeel Soleimani[1], Reza Tahmasebi[2], Hadi Daneshmandi[3*], Seyed Hossein Salimi[2] and Fereshteh Aliasghari[4]

Abstract

Background Pharmacists face unique occupational challenges that can impact their health and well-being. This study examines the relationships between work-life balance factors, physical activity, sleep quality, and general health among pharmacists in Shiraz, Iran.

Methods A cross-sectional survey was conducted from 7 August 2021 to 21 November 2021 among 136 pharmacists working in community and hospital pharmacies in Shiraz. Participants were selected using stratified random sampling. The Persian versions of the International Physical Activity Questionnaire (P-IPAQ), Pittsburgh Sleep Quality Index (P-PSQI), and General Health Questionnaire (P-GHQ-28) were used to assess physical activity, sleep quality, and general health status, respectively. Data were analyzed using descriptive statistics, Chi-square, Fisher's exact, Mann-Whitney U, and Kruskal-Wallis tests. Statistical significance was set at $p < 0.05$.

Results Low physical activity was reported by 35.3% of pharmacists, with longer work hours significantly associated with lower physical activity ($p = 0.009$). Poor sleep quality was prevalent in 57.4% of participants, with no significant associations with demographic variables. General health was categorized as unhealthy for 50.7% of pharmacists, with female pharmacists more likely to be in this category ($\chi 2 = 4.383$, $p = 0.036$). Older pharmacists reported better general health status (Mann-Whitney U = 1792.500, $p = 0.024$).

Conclusions Pharmacists face significant challenges in maintaining work-life balance, evidenced by low physical activity, poor sleep quality, and compromised general health. Targeted interventions, including workplace exercise programs, optimized schedules, and comprehensive wellness initiatives, are needed to support pharmacists' well-being and enhance patient care quality.

Keywords Pharmacists, Work-life balance, Physical activity, Sleep quality, General health

*Correspondence:
Hadi Daneshmandi
ha.daneshmandi@gmail.com
[1]Department of Occupational Health, Research Center for Health Sciences, Institute of Health, Shiraz University of Medical Sciences, Shiraz, Iran
[2]Student Research Committee, Shiraz University of Medical Sciences, Shiraz, Iran
[3]Research Center for Health Sciences, Institute of Health, Shiraz University of Medical Sciences, Shiraz, Iran
[4]Department of Clinical Nutrition, School of Nutrition and Food Sciences, Shiraz University of Medical Sciences, Shiraz, Iran

Background

The healthcare industry, particularly the field of pharmacy, is renowned for its demanding work environment and high-stress levels. Pharmacists play a crucial role in patient care, medication management, and public health [1, 2]. However, the nature of their work often involves long hours, shift work, and high-pressure situations, which can significantly impact their work-life balance and overall health [3, 4].

Work-life balance, defined as the equilibrium between professional responsibilities and personal life, has been recognized as a critical factor in occupational health. Poor work-life balance can lead to various negative health outcomes, including reduced physical activity, sleep disturbances, and compromised mental health [5]. These factors, in turn, can affect job performance, patient safety, and the overall quality of pharmaceutical care [6]. Achieving this balance is particularly challenging for healthcare professionals, including pharmacists, due to the demanding nature of their work. As healthcare systems worldwide face increasing demands and challenges, the well-being of healthcare professionals, including pharmacists, has become a growing concern [7].

While numerous studies have examined work-life balance and health outcomes among physicians and nurses, relatively less attention has been paid to pharmacists [8]. This gap in research is particularly concerning given the unique stressors faced by pharmacists, such as the responsibility for accurate medication dispensing, patient counseling, and managing drug interactions, all while working in fast-paced environments with limited breaks.

Recent studies in various countries have highlighted the importance of maintaining a healthy work-life balance for pharmacists. For instance, a study in the United States found that pharmacists experiencing poor work-life balance were more likely to report burnout and job dissatisfaction [9]. Similarly, research in Malaysia indicated that early-career pharmacists often struggle with balancing professional demands and personal life, leading to increased stress levels [2]. In the United States, a survey of hospital pharmacists revealed that work-life balance was a significant factor in job retention and career satisfaction [10].

Despite these international findings, there is a paucity of research specifically examining the interplay between work-life balance factors, physical activity, sleep quality, and general health among pharmacists in Iran. This gap is significant because cultural, societal, and healthcare system differences may influence how work-life balance impacts health outcomes in different contexts.

This study aims to examine the intricate relationship between work-life balance and health among pharmacists, focusing on three key aspects: physical activity, sleep quality, and general health status. These factors are known to be important indicators of overall well-being and can be significantly influenced by work demands and lifestyle choices [11, 12]. By exploring these interconnected elements, we hope to gain a comprehensive understanding of the health landscape for pharmacists and identify potential areas for intervention and improvement.

Physical activity has been shown to have numerous health benefits, including stress reduction, improved cardiovascular health, and enhanced cognitive function. Regular exercise is also associated with better mental health outcomes, reduced risk of chronic diseases, and improved overall quality of life [13–15]. However, the demanding nature of pharmacy work, often characterized by long standing hours and limited breaks, may restrict opportunities for regular exercise [16]. Understanding the current level of physical activity among pharmacists is crucial for developing targeted interventions to promote healthier lifestyles within this profession. This study will assess not only the frequency and intensity of physical activity but also the barriers and facilitators that pharmacists encounter in maintaining an active lifestyle.

Sleep quality is another critical factor in maintaining good health and work performance. Pharmacists often work irregular hours or night shifts, which can disrupt natural sleep patterns and lead to sleep disorders [17]. Poor sleep quality has been linked to decreased cognitive function, increased risk of errors, compromised immune function, and various long-term health issues such as cardiovascular disease and metabolic disorders [18]. Moreover, chronic sleep deprivation can exacerbate work-related stress and negatively impact job satisfaction and performance [19]. Assessing sleep quality among pharmacists can provide valuable insights into potential areas for improvement in work scheduling, sleep hygiene practices, and the development of supportive workplace policies.

Lastly, the general health status of pharmacists is a comprehensive measure that encompasses physical, mental, and emotional well-being. Factors such as chronic stress, sedentary behavior, poor dietary habits, and limited time for self-care can contribute to a range of health issues [20]. Pharmacists may be particularly susceptible to occupational health hazards, including musculoskeletal disorders from prolonged standing, eye strain from computer use, and psychological stress from patient interactions and workload pressures [21]. Evaluating the overall health status of pharmacists can help identify specific health concerns prevalent in this population and inform the development of targeted health promotion strategies. This assessment will include measures of physical health indicators, mental health status, and self-reported health-related quality of life.

By examining these three interconnected aspects of health in relation to work-life balance, this study aims to provide a comprehensive understanding of the current health status of pharmacists and identify potential areas for intervention. The findings of this research may have important implications for pharmacy practice, workplace policies, and public health initiatives aimed at improving the well-being of healthcare professionals.

The current study aimed to investigate the relationships between work-life balance factors, including physical activity, sleep quality, and general health among Iranian pharmacists. By focusing on these specific health indicators within the context of work-life balance, we hope to contribute to the growing body of literature on occupational health in healthcare settings and provide actionable insights for improving the well-being of pharmacists in Iran and potentially in other similar contexts.

Methods

Study design and setting

This cross-sectional study was conducted among pharmacists working in community and hospital pharmacies in Shiraz, Iran from 7 August 2021 to 21 November 2021. Participants were selected from a comprehensive list of registered pharmacies obtained from the Shiraz University of Medical Sciences.

Inclusion criteria were: (1) Licensed pharmacists actively working in Shiraz pharmacies, (2) At least one year of work experience, and (3) Willingness to participate in the study. Exclusion criteria included: (1) Incomplete questionnaires, and (2) Pharmacists on extended leave during the study period.

Participants and sampling

The sample size was calculated using the formula for estimating a proportion in a finite population:

$$n = (N * Z\hat{}2 * p * (1-p)) \; / \; (d\hat{}2 * (N-1) + Z\hat{}2 * p * (1-p))$$

Where:

N = Total number of active pharmacists in Shiraz (≈680).

Z = 1.96 (for 95% confidence level).

p = Expected proportion (0.5, for maximum sample size).

d = Precision (0.08).

This yielded a required sample size of 123. Accounting for a 20% non-response rate, we aimed to recruit 148 pharmacists. Finally, 136 questionnaires completely filled out by participants.

We employed a stratified random sampling technique to ensure representation from both community and hospital pharmacies. All participants provided electronic informed consent before participating in the study. Data were collected anonymously, and participants were assured of the confidentiality of their responses. The study was approved by the ethic committee of Shiraz University of Medical Sciences (Approval ID: IR.SUMS.REC.1400.294). Additionally, the study was performed in accordance with the Helsinki Declaration of 2013 [22].

Data gathering tools

Demographic/occupational questionnaire

Participants completed a custom-designed demographic/occupational questionnaire that gathered information on age (years), work history (years), work hours per day, work days per week, gender (male/female), marital status (single/married/divorced), smoking (yes/no), and second job (yes/no).

Persian version of the International Physical Activity Questionnaire (P-IPAQ)

The short form of the IPAQ was used to assess physical activity levels. This 7-item questionnaire measures the frequency (days per week) and duration (minutes per day) of three specific types of activity: walking, moderate-intensity activities, and vigorous-intensity activities. The IPAQ provides continuous scores in Metabolic Equivalent Task (MET)-minutes per week and categorical scores (low: < 600 MET-min/week, moderate: 600–3000 MET-min/week, high activity: > 3000 MET-min/week). The Persian short form version of IPAQ has demonstrated good reliability and validity in Gholamnia-Shirvani et al. study (Intraclass Correlation Coefficient (ICC) = 0.85) [23]. In the current study, Cronbach's alpha of the questionnaire was calculated as 0.763.

Persian version of the Pittsburgh Sleep Quality Index (P-PSQI)

The PSQI is a 19-item self-report questionnaire that assesses sleep quality over the past month. It evaluates seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. Each component is scored from 0 to 3, yielding a global PSQI score ranging from 0 to 21, with higher scores indicating poorer sleep quality. A global PSQI score > 5 is indicative of poor sleep quality. We used the Persian version of the PSQI, which has demonstrated good psychometric properties (Cronbach's alpha = 0.77) in Farrahi Moghaddam et al. study [24]. Cronbach's alpha of the P-PSQI in the present study was 0.811.

Persian version of the General Health Questionnaire (P-GHQ-28)

The 28-item version of the GHQ was used to assess psychological well-being. This instrument consists of four subscales: somatic symptoms, anxiety and insomnia,

Table 1 Demographic/occupational characteristics of the participant ($n=136$)

Quantitative variable		Mean ± SD
Age (years)		37.03 ± 8.72
Work history (years)		11.09 ± 7.89
Work hours per day		7.75 ± 2.55
Work days per week		5.51 ± 0.89
Qualitative variable		***No. (%)***
Gender	*Male*	49 (36.0)
	Female	87 (64.0)
Marital status	*Single*	38 (27.9)
	Married	94 (69.1)
	Divorced	4 (2.9)
Smoking	*Yes*	11 (8.1)
	No	125 (91.9)
Second job	*Yes*	16 (11.8)
	No	120 (88.2)

social dysfunction, and severe depression. Each item is rated on a 4-point Likert scale (0–3). The total score ranges from 0 to 84, with higher scores indicating poorer mental health. A cut-off score of 23 was used to identify potential cases of psychological distress, based on Noorbala et al. study ($r=0.85$) in Iranian populations [25]. In the current study, Cronbach's alpha of the questionnaire was calculated as 0.926.

Data collection procedure

Data were collected using a secure, web-based survey platform. Potential participants were contacted via email and provided with a unique link to access the survey. Reminder emails were sent at 1-week and 2-week intervals to non-responders. The survey remained open for a total of 4 weeks.

Statistical analysis

All statistical analyses were performed using SPSS version 16. Descriptive statistics were calculated for all variables, including means, standard deviations, frequencies, and percentages as appropriate. The normality of continuous variables was assessed using the Kolmogorov-Smirnov test. Based on Kolmogorov-Smirnov, all p-values were <0.001 for quantitative variables including "age", "work history", "work hours per day", and "work days per week", which are used in the statistical analysis. Mann-Whitney U and Fisher's exact tests were used to compare continuous variables between two groups, while Kruskal-Wallis test were employed for comparisons across multiple groups. A p-value <0.05 was considered statistically significant for all analyses.

Table 2 Distribution of physical activity levels, sleep quality, and general health status among pharmacists ($n=136$)

Variable		No. (%)
Physical activity*	*Low*	48 (35.3)
	Moderate	55 (40.4)
	High	33 (24.3)
Sleep quality	*Good sleep*	58 (42.6)
	Poor sleep	78 (57.4)
General health	*Healthy*	67 (49.3)
	Unhealthy	69 (50.7)

*Low: < 600 MET-min/week, Moderate: 600–3000 MET-min/week, High: > 3000 MET-min/week

Results

Descriptive statistics

Total of 136 pharmacists participated in this study. The mean age of the participants was 37.03 ± 8.72 years. The majority of the sample was female (64.0%), and most participants were married (69.1%). The average work history was 11.09 ± 7.89 years, with participants working an average of 7.75 ± 2.55 h per day and 5.51 ± 0.89 days per week. The study population predominantly consisted of non-smokers (91.9%), and most participants did not have a second job (88.2%) (Table 1).

The results indicate that a considerable proportion of pharmacists (35.3%) had low physical activity levels, while 40.4% engaged in moderate physical activity, and 24.3% reported high levels of physical activity. Regarding sleep quality, more than half of the participants (57.4%) reported poor sleep quality, which is a concerning finding. The general health status of the pharmacists was almost evenly split, with 50.7% categorized as unhealthy and 49.3% as healthy based on the P-GHQ (Table 2).

Demographic/occupational variables and physical activity

Table 3 shows associations between demographic/occupational variables and physical activity. A Kruskal-Wallis test revealed a significant difference in work hours per day across physical activity levels ($H=9.448$, $df=2$, $p=0.009$). Post-hoc Mann-Whitney U tests showed that pharmacists with low physical activity worked significantly more hours per day compared to those with moderate ($U=891.000$, $p=0.004$) and high ($U=592.500$, $p=0.044$) physical activity levels. This finding suggests that longer working hours may be a barrier to engaging in physical activity for pharmacists.

No significant associations were found between physical activity levels and other demographic/occupational variables, including age, work history, work days per week, gender, smoking status, marital status, interest in job, having a second job, job stress, disability, or family loss (all $p>0.05$). This suggests that work hours may be a particularly important factor influencing physical activity levels among pharmacists.

Table 3 Associations between demographic/occupational variables and physical activity ($n=136$)

		Physical activity			
Quantitative variable		***Low Median (IQR*)***	***Moderate Median (IQR*)***	***High Median (IQR*)***	***p-value†***
Age (years)		35.5 (10)	34 (12)	38 (13.5)	0.511
Work history (years)		10 (3)	9 (2)	10 (3.5)	0.955
Work hours per day		8 (2.75)	7 (4)	8 (1. 5)	0.009
Work days per week		6 (1)	5 (1)	6 (1)	0.194
Qualitative variable		***Low No. (%)***	***Moderate No. (%)***	***High No. (%)***	***p-value****
Gender	*Male*	18 (36.7)	16 (32.7)	15 (30.6)	0.291
	Female	30 (34.5)	39 (44.8)	18 (20.7)	
Marital status	*Single*	10 (26.3)	18 (47.4)	10 (26.3)	0.474
	Married	37 (39.4)	36 (38.3)	21 (22.3)	
	Divorced	1 (25.0)	1 (25.0)	2 (50.0)	
Smoking	*Yes*	3 (27.3)	3 (27.3)	5 (45.4)	0.229
	No	45 (36.0)	52 (41.6)	28 (22.4)	
Second job	*Yes*	8 (50.0)	4 (25.0)	4 (25.0)	0.336
	No	40 (33.3)	51 (42.5)	29 (24.2)	

*Interquartile Range

†Kruskal-Wallis

**Chi-square

Table 4 Associations between demographic/occupational variables and sleep quality ($n=136$)

		Sleep quality		
Quantitative variable		***Poor Median (IQR*)***	***Good Median (IQR*)***	***p-value†***
Age (years)		35 (10)	36.5 (15)	0.396
Work history (years)		10 (2.5)	9.5 (5.25)	0.391
Work hours per day		8 (4)	8 (3.25)	0.889
Work days per week		6 (1)	6 (1)	0.994
Qualitative variable		***Poor No. (%)***	***Good No. (%)***	***p-value***
Gender	*Male*	23 (46.9)	26 (53.1)	0.065**
	Female	55 (63.2)	32 (36.8)	
Marital status	*Single*	21 (55.3)	17 (44.7)	0.904**
	Married	55 (58.5)	39 (41.5)	
	Divorced	2 (50.0)	2 (50.0)	
Smoking	*Yes*	9 (81.8)	2 (18.2)	0.078††
	No	69 (55.2)	56 (44.8)	
Second job	*Yes*	9 (56.3)	7 (43.7)	0.920**
	No	69 (57.5)	51 (42.5)	

*Interquartile Range

†Mann-Whitney U

**Chi-square

††Fisher's exact

Table 5 Associations between demographic/occupational variables and general health ($n=136$)

		General health		
Quantitative variable		***Healthy Median (IQR*)***	***Unhealthy Median (IQR*)***	***p-value†***
Age (years)		38 (14)	33 (10)	0.024
Work history (years)		12 (6)	8 (3.5)	0.078
Work hours per day		8 (3)	8 (4)	0.773
Work days per week		6 (1)	6 (1)	0.632
Qualitative variable		***Healthy No. (%)***	***Unhealthy No. (%)***	***p-value****
Gender	*Male*	30 (61.2)	19 (38.8)	0.036
	Female	37 (42.5)	50 (57.5)	
Marital status	*Single*	16 (42.1)	22 (57.9)	0.375
	Married	48 (51.1)	46 (48.9)	
	Divorced	3 (75.0)	1 (25.0)	
Smoking	*Yes*	6 (54.5)	5 (45.5)	0.715
	No	61 (48.8)	64 (51.2)	
Second job	*Yes*	9 (56.3)	7 (43.7)	0.552
	No	58 (48.3)	62 (51.7)	

*Interquartile Range

†Mann-Whitney U

**Chi-square

Demographic/occupational variables and sleep quality

Table 4 displays associations between demographic/occupational variables and sleep quality. No statistically significant associations were found between sleep quality and any of the demographic/occupational variables examined (all $p>0.05$). This includes age, work history, work hours per day, work days per week (analyzed using Mann-Whitney U tests), gender, smoking status, marital status, interest in job, having a second job, job stress, disability, and family loss (analyzed using Chi-square tests or Fisher's exact tests where appropriate). The lack of significant associations suggests that sleep quality issues may be prevalent across various demographic/occupational groups within the pharmacist population, highlighting the need for broader interventions to improve sleep quality.

Demographic/occupational variables and general health status

Table 5 demonstrates associations between demographic/occupational variables and general health. The results indicate that a higher proportion of female pharmacists were categorized as unhealthy compared to their male counterparts. Age was also significantly associated with general health status (Mann-Whitney U=1792.500, $p=0.024$), with healthy pharmacists having a higher mean rank (76.25) compared to unhealthy pharmacists

(60.98). This indicates that older pharmacists tended to report better general health status.

A significant association was found between gender and general health status ($\chi2=4.383$, df=1, $p=0.036$).

Physical activity and sleep quality

The relationship between physical activity levels and sleep quality was examined using a chi-square test. The results approached statistical significance ($\chi2=5.561$, df=2, $p=0.062$). Table 6 shows association between physical activity and sleep quality.

Physical activity and general health

The association between physical activity levels and general health status was analyzed using a chi-square test. The results approached statistical significance ($\chi2=4.620$, df=2, $p=0.099$). Table 7 presents association between physical activity and general health.

Table 6 Association between physical activity and sleep quality ($n=136$)

Physical activity*	Sleep quality		*p-value*†
	Good sleep	Poor sleep	
Low	14 (24.1%)	34 (43.6%)	0.062
Moderate	27 (46.6%)	28 (35.9%)	
High	17 (29.3%)	16 (20.5%)	

*Low: < 600 MET-min/week, Moderate: 600-3000 MET-min/week, High: > 3000 MET-min/week

†Chi-square

Table 7 Association between physical activity and general health ($n=136$)

Physical activity*	General health status		*p-value*†
	Healthy	Unhealthy	
Low	18 (26.9%)	30 (43.5%)	0.099
Moderate	29 (43.3%)	26 (37.7%)	
High	20 (29.9%)	13 (18.8%)	

*Low: < 600 MET-min/week, Moderate: 600-3000 MET-min/week, High: > 3000 MET-min/week

†Chi-square

Discussion

This study examined the complex relationships between work-life balance factors, physical activity, sleep quality, and general health among pharmacists in Shiraz, Iran. Our key findings revealed concerning trends in the health and well-being of pharmacists, with a substantial proportion reporting low physical activity levels, poor sleep quality, and suboptimal general health status. These results highlight the complex interplay between occupational demands and health outcomes in the pharmacy profession, warranting further discussion in the context of recent literature.

Physical activity

Our study found that 35.3% of pharmacists reported low levels of physical activity, with only 24.3% engaging in high levels. This finding aligns closely with recent research in the pharmacy profession. For instance, Viegas et al. reported that only 37% of community pharmacists in Portugal met recommended physical activity levels, corroborating our observations [26]. This is concerning, as regular physical activity is crucial for maintaining good health and managing work-related stress. The low levels of physical activity observed may be attributed to the demanding nature of pharmacy work, characterized by long standing hours and limited breaks [27, 28]. This sedentary work environment, combined with high-stress levels and time constraints, likely contributes to the difficulty pharmacists face in maintaining regular exercise routines [2, 26].

Our analysis found a significant relationship between work hours per day and physical activity levels, with pharmacists working longer hours reporting lower levels of physical activity [29]. This finding underscores the impact of workload on health behaviors and suggests that time constraints are a major barrier to regular exercise for pharmacists. Cook and Gazmararian demonstrated an inverse relationship between long work hours and leisure-time physical activity across various professions, lending support to our observations in the pharmacy context [29]. The implications of this relationship are profound, suggesting that the demanding nature of pharmacy work, characterized by long standing hours and high workload, may be directly impeding pharmacists' ability to engage in regular exercise.

Interestingly, our study found no significant associations between physical activity levels and other demographic variables such as age or gender. This suggests that time constraints, rather than individual characteristics, may be the primary barrier to regular exercise for pharmacists. This finding is partially supported by Watterson et al. who identified workload and time pressures as significant contributors to occupational fatigue among pharmacists [28]. The cumulative effect of these factors could create a cycle where work-related fatigue reduces the likelihood of engaging in physical activity, potentially exacerbating health issues over time.

Sleep quality

The high prevalence of poor sleep quality (57.4%) among pharmacists in our study is alarming and warrants immediate attention. Poor sleep quality has been associated with decreased cognitive function, increased risk of errors, and various long-term health issues [30]. This finding is remarkably consistent with recent literature from other countries. Fuentes-Senise and García-Corpas reported poor sleep quality in 48.7% of community pharmacists in Spain, a figure strikingly similar to our results

[31]. The consistency of these findings across different cultural and healthcare contexts suggests that sleep issues may be an inherent challenge in the pharmacy profession, potentially linked to common factors such as irregular work schedules, high stress levels, and the cognitive demands of the job.

The lack of significant associations between sleep quality and demographic variables suggests that sleep problems are widespread across the profession, potentially indicating systemic issues related to work schedules and stress levels [17, 31]. This universal nature of sleep issues among pharmacists aligns with findings from Basheti et al. who highlighted that pharmacists face unique challenges to maintaining good sleep hygiene due to work-related factors such as shift work and high stress levels [32]. This ubiquity of sleep issues points to the need for profession-wide interventions rather than targeted approaches based on specific demographics. While our results only approached statistical significance, there was a trend suggesting a relationship between physical activity levels and sleep quality. This potential link between exercise and improved sleep underscores the interconnected nature of health behaviors and highlights the potential for interventions targeting physical activity to have cascading benefits on sleep and overall well-being.

The high prevalence of poor sleep quality among pharmacists also raises questions about patient safety and the quality of pharmaceutical care. Sleep-deprived healthcare professionals are more prone to errors, which in the context of pharmacy practice, could have serious consequences [33]. This finding emphasizes the need for workplace policies that prioritize adequate rest and recovery time for pharmacists.

General health

The finding that 50.7% of pharmacists were categorized as unhealthy based on P-GHQ is deeply concerning and highlights the need for targeted interventions to improve the overall health of this working group. Melnyk et al. reported similarly alarming statistics, with 61.2% of pharmacists reporting poor mental health during the COVID-19 pandemic [34]. This high prevalence of poor health status among pharmacists is likely multifactorial, influenced by work-related stress, sedentary behavior, poor sleep quality, and potentially inadequate self-care practices.

The significant association between gender and general health status, with female pharmacists more likely to be categorized as unhealthy, warrants further investigation. This aligns with recent research by Gernant et al. who found that female pharmacists reported higher levels of stress during the COVID-19 pandemic compared to their male counterparts [35]. This gender disparity may reflect broader societal issues, such as the "double burden" of work and family responsibilities often experienced by women. Female pharmacists may face unique challenges in balancing professional demands with personal and family obligations, leading to increased stress and poorer health outcomes [35, 36]. This finding underscores the need for gender-sensitive approaches to workplace health promotion and support systems.

The positive association between age and better general health status was unexpected, as health typically declines with age. Protano et al. found that older age was associated with higher burnout levels among pharmacists in Italy [37]. Our contradictory finding might reflect a "healthy worker effect," where those who remain in the profession longer are inherently healthier or have developed better coping mechanisms over time [38]. Alternatively, it could indicate that more experienced pharmacists have found ways to better manage work-life balance and job-related stress. This suggests that there may be valuable lessons to be learned from older pharmacists in terms of resilience and stress management strategies.

The overall health status of pharmacists has implications not only for individual well-being but also for the sustainability of the pharmacy workforce. Poor health can lead to increased absenteeism, reduced productivity, and potentially early exit from the profession [34, 37]. Given the critical role pharmacists play in healthcare systems, ensuring their health and well-being should be a priority for healthcare organizations and policymakers.

Implications and recommendations

The findings of this study have several important implications for pharmacy practice and occupational health policies:

- Workplace interventions: There is a clear need for interventions to promote physical activity among pharmacists, particularly those working longer hours. This could include workplace exercise programs, standing desks, or policies encouraging regular breaks for physical activity.
- Work schedule optimization: Given the high prevalence of poor sleep quality, pharmacy managers should consider implementing more flexible scheduling options and ensuring adequate rest periods between shifts.
- Gender-specific health support: The disparity in general health status between male and female pharmacists suggests a need for targeted support and interventions for female pharmacists, potentially addressing work-life balance challenges.
- Holistic health promotion: Comprehensive workplace wellness programs addressing physical activity, sleep hygiene, and stress management could

be beneficial in improving the overall health of pharmacists.

- Professional development: Training programs on time management, stress coping strategies, and maintaining work-life balance could be incorporated into continuing education for pharmacists.
- Ergonomic improvements: Given the long-standing hours associated with pharmacy work, ergonomic interventions such as anti-fatigue mats, proper lighting, and ergonomically designed workstations could help reduce physical strain and promote better health.

Limitations

Given the cross-sectional design of the study and data collection by self-report, the findings should be interpreted cautiously. Moreover, this study was performed among pharmacists in Shiraz. Therefore, the results might not be generalized to other working groups. Furthermore, this study was conducted on a small sample. Hence, a larger sample size is needed to achieve more robust results in this context.

Conclusion

This study provides valuable insights into the complex relationships between work-life balance, physical activity, sleep quality, and general health among pharmacists in Shiraz, Iran. Our findings highlight significant concerns regarding low physical activity levels, poor sleep quality, and suboptimal general health status in this crucial healthcare profession. The results underscore the need for targeted interventions and policy changes to support the health and well-being of pharmacists. Based on our findings, we recommend workplace interventions to promote physical activity, strategies to improve sleep hygiene, gender-specific health support programs, and comprehensive wellness initiatives addressing multiple aspects of pharmacist health. Future research should focus on evaluating the effectiveness of these interventions, exploring the underlying causes of gender disparities in health outcomes, and investigating factors contributing to better health among older pharmacists.

Abbreviations

ICC	Intraclass Correlation Coefficient
MET	Metabolic Equivalent Task
P-IPAQ	Persian version of the International Physical Activity Questionnaire
P-GHQ-28	Persian version of the General Health Questionnaire
P-PSQI	Persian version of the Pittsburgh Sleep Quality Index
WHO	World Health Organization

Acknowledgements

This paper was extracted from the thesis written by Mr. Seyed Hossein Salimi. Hereby, the authors wish to thank the pharmacists who participated in the study.

Authors' contributions

ES, RT, HD, and FA were involved in the study design, analysis and interpretation of the data, drafting of the manuscript. SHS was involved in the study design, data collection, drafting of the manuscript. All authors have read and approved the final manuscript.

Funding

The present study was financially supported by Shiraz University of Medical Sciences [grant No. 22953].

Availability of data and materials

We are unable to share data publicly because of ethical and legal restrictions. The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study was approved by the ethic committee of Shiraz University of Medical Sciences (Approval ID: IR.SUMS.REC.1400.294) and conducted according to the Helsinki Declaration and its later amendments. Written informed consent was obtained from all patients who participated in this study.

Consent for publication

'Not applicable' for that section.

Competing interests

The authors declare no competing interests.

Received: 8 August 2024 / Accepted: 3 October 2024
Published online: 11 October 2024

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