

KNOWLEDGE, ATTITUDE, AND PRACTICE REGARDING ERGONOMIC PRINCIPLES AMONG ALLIED HEALTH SCIENCES UNDERGRADUATE STUDENTS IN INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA, KUANTAN: AN ISLAMIC PERSPECTIVE

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Abstract: *Ergonomics is a multidisciplinary field that applies scientific principles to optimise human interaction with the environment, enhancing health, well-being, and system performance. It is crucial in preventing musculoskeletal disorders (MSDS) and improving productivity, particularly for students engaged in prolonged sedentary activities. Despite its significance, there is limited research on undergraduate students' knowledge, attitudes, and practices (KAP) regarding ergonomics, highlighting the need for greater awareness and education. From an Islamic perspective, ergonomics aligns with fundamental principles such as balance (mīzān), moderation (wasatiyyah), and health preservation (hifz al-nafs), which are part of Maqasid al-Shariah. Islam encourages the integration of knowledge and technology to enhance well-being, promoting structured guidance in daily activities, including study and work environments. This study investigates the KAP of ergonomics among 121 undergraduate students at the Kulliyah of Allied Health Sciences (KAHS), International Islamic University Malaysia (IIUM), Kuantan. A cross-sectional study was conducted using an online survey via Google Forms. The data were analysed using IBM SPSS version 20. While 75.2% of students have a positive attitude, 52.9% demonstrate poor knowledge, and 56.2% exhibit inadequate ergonomic practices. The findings emphasise the need for integrating Islamic-based ergonomic education with modern technological advancements to improve student well-being and productivity. Future research should explore Islamic approaches to ergonomics in science, technology, and education to bridge the gap between traditional wisdom and contemporary scientific practices.*

Keywords: *Ergonomics, Islamic Perspective, Knowledge, Practice, Attitude.*

Introduction

Work-related musculoskeletal disorders (WMSDs) are prevalent among students, particularly in physically demanding fields. Factors such as prolonged poor posture, improper workstation setups, and a lack of ergonomic awareness increase musculoskeletal issues among university students. Research indicates that many undergraduates experience neck, back, and shoulder pain due to extended study hours and poor sitting positions. Additionally, the development of WMSDs is influenced by various risk factors, including gender, age, weight, and environmental conditions (Yasobant & Rajkumar, 2014). Ergonomics is pivotal in minimising musculoskeletal disorders (MSDS) and optimising human performance by fostering proper posture, mobility, and environmental design. It involves creating tasks, environments, and workspaces that align with human capabilities and limitations, thereby reducing the risk of injury and enhancing overall productivity. Kalra et al. (2018) emphasise that ergonomics is not only a technical consideration but also a human-centred approach that accounts for posture, movement, and system design in promoting health and efficiency. Similarly, Punchihewa and Gyi (2015) highlight its vital role in mitigating MSDs and improving workplace performance.

From an Islamic perspective, the principles of ergonomics resonate closely with core tenets of Maqasid al-Shariah, particularly *hifz al-nafs* (preservation of life and well-being), *mīzān* (balance), and *wasatiyyah* (moderation). Islam advocates for structured and purposeful living, including how individuals work and study. This perspective supports the integration of science and technology to protect human dignity and welfare, encouraging the adoption of practices that promote physical and mental well-being (Kamali, 2008; Dusuki & Abdullah, 2007). When aligned with these Islamic values, Ergonomic principles provide a holistic framework that supports both spiritual and physical health.

Despite these recognized benefits, there is a notable scarcity of research examining the knowledge, attitudes, and practices (KAP) related to ergonomics among undergraduate students, particularly in Malaysian institutions of higher learning. This gap is especially significant in Allied Health Sciences, where students frequently engage in physically demanding academic and clinical activities. Thus, this study seeks to evaluate the ergonomic KAP among Allied Health Sciences students at IIUM Kuantan, investigating their practical application of ergonomic knowledge and its alignment with Islamic principles that promote health, moderation, and structured behaviour. While ergonomics has evolved significantly within industrial and clinical settings, its implementation in academic environments, especially through an Islamic lens, remains underexplored and warrants focused investigation.

Materials And Methods

Study Design

This study implemented a cross-sectional survey design suitable for assessing the prevalence of ergonomic knowledge, attitude, and practice (KAP) at a specific time.

Participants

A total of 121 undergraduate students from KAHS, IIUM Kuantan, participated in this study. The participants were selected through convenience sampling, where only students who voluntarily agreed to participate and met the inclusion criteria were recruited. This study included active undergraduate students enrolled in KAHS, IIUM Kuantan, who could

understand and complete the questionnaire in English. These students were selected based on their availability and willingness to participate.

Questionnaire

This study utilised a questionnaire, adapted from Alwahaibi et al. (2022), to assess participants' knowledge, attitudes, and practices (KAP) regarding ergonomic principles. The data collection instrument was a structured questionnaire divided into two main sections. Part A gathered demographic information, including age, gender, year of study, and course of study. Part B evaluated KAP concerning ergonomic principles, comprising 25 questions across three subsections. Section A, assessing knowledge, consisted of eight questions with response options of 'yes', 'to some extent', or 'no'. A scoring system was used where incorrect answers received zero points, and correct answers received two points. Section B evaluated attitudes using an eight-question, five-point Likert scale, ranging from 'strongly disagree' to 'strongly agree'. For positive statements in this section, the scoring was: strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, strongly agree = 5. The scoring was reversed for negative statements. Section C assessed practical application through nine questions with response options of 'yes', 'sometimes', or 'no'. For positive statements in this section, the scoring was yes = 2, sometimes = 1, and no = 0. The scoring was reversed for negative statements. The questionnaire was distributed electronically through Google Forms and shared via WhatsApp group chats across different academic batches and departments within KAHS. The data collection period lasted for four weeks to ensure comprehensive participation. The questionnaire used in this study was adapted from a previously validated instrument developed by Alwahaibi et al. (2022), which demonstrated good internal consistency in their study population. While the current study did not perform a separate reliability analysis, the original tool reported Cronbach's alpha values of 0.79 for the knowledge section, 0.83 for attitude, and 0.77 for practice, indicating acceptable internal consistency.

Data Analysis

The collected data was analysed using SPSS version 20. Descriptive statistics, such as frequencies and percentages, were used to describe sociodemographic data and to analyse students' knowledge, attitudes, and practice levels. Pearson correlation tests were used to determine the association between knowledge, attitude, and practice of ergonomic principles among students. A statistically significant value was set at $p \leq 0.05$.

Ethical Considerations

This study was approved by IIUM's research ethics committee (IIUM/504/14/11/2/ IREC 2024- KAHS/DPRS)

Results

Table 1 shows the demographic characteristics of the students. The sample comprised 60.3% females ($n=73$) and 39.7% males ($n=48$), with a mean age of 21.00 ± 1.335 years. The majority (82.6%) were aged 20-23 years. The third and fourth-year students had the highest representation (32.2% each), and the Department of Physical Rehabilitation Sciences was the most represented department (33.9%).

Table 1: Demographic Description of The Students (N=121)

Demographic	Frequency(n)	Percentage (%)
Mean age (SD*)	21.00	1.335
Age group (years)		
<20	18	14.9
20-23	100	82.6
>23	3	2.5
Gender		
Male	48	39.7
Female	73	60.3
Year of study		
1 st Year	21	17.4
2 nd Year	22	18.2
3 rd Year	39	32.2
4 th Year	39	32.2
Department		
Nutrition Sciences	15	12.4
Biomedical Science	18	14.9
Optometry and Visual Sciences	17	14.0
Diagnostic Imaging and Radiotherapy	16	13.2
Physical Rehabilitation Sciences	41	33.9
Audiology and Speech-Language Pathology	14	11.6

Regarding the level of KAP, as shown in Table 2 and Figure 1, 52.9% of students demonstrated poor knowledge of ergonomics, indicating a lack of understanding of fundamental ergonomic principles. Despite this, attitudes toward ergonomics were largely positive, with 75.2% of students expressing a favourable outlook toward proper ergonomic practices and awareness. However, only 43.8% of students practiced ergonomics adequately, while 56.2% exhibited poor ergonomic practices.

Table 2: Frequency and percentage of students according to category

Category	Frequency (n)	Percentage (%)
Knowledge		
Good	57	47.1
Poor	64	52.9
Attitude		
Positive	91	75.2
Negative	30	24.8
Practice		
Good	53	43.8
Poor	68	56.2

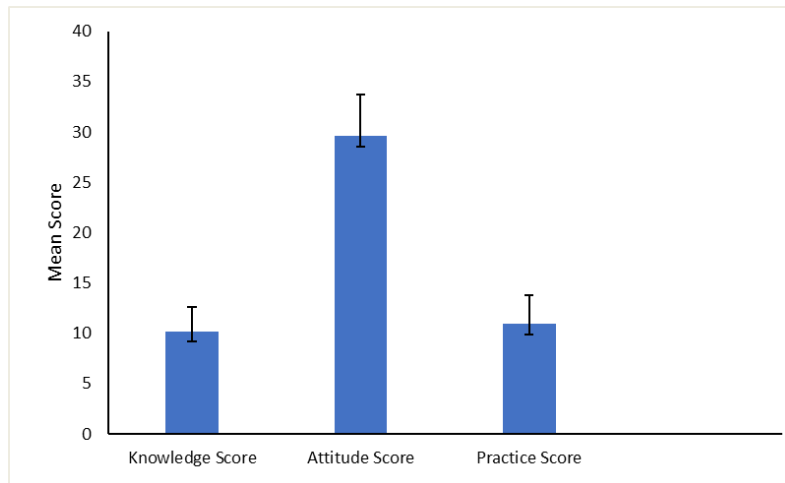


Figure 1: The Total Score Of Knowledge, Attitude, And Practice.

The students' knowledge of ergonomic principles is shown in Table 3. The study revealed that 46.3% of students were familiar with the definition of ergonomics, and 47.1% understood its benefits. While 50.4% were aware of health hazards associated with neglecting ergonomics, significant knowledge gaps were observed. Specifically, 39.7% were unaware of ergonomics' influence on behaviour and environment, and only 37.2% had moderate awareness of its health and cost-saving benefits. In contrast, students demonstrated stronger knowledge of MSDs related to poor ergonomic practices. For instance, 65.3% correctly identified relaxed shoulders as a contributor to MSDs, 50.4% recognised prolonged use of small instruments, and 76.9% identified frequent heavy equipment lifting.

Table 3: Students' Knowledge Of Ergonomic Principles (N=121)

Statement	Yes n (%)	No n (%)	To some extent n (%)
Do you know what is meant by ergonomics?	56 (46.3)	23 (19.0)	42 (34.7)
Do you know the benefits of ergonomics application?	57 (47.1)	26 (21.5)	38 (31.4)
Do you know what the health hazards of your job without ergonomics are?	61 (50.4)	33 (27.3)	27 (22.3)
Ergonomics principles try to change the student behaviour and not to change the study environment.	26 (21.5)	47 (38.8)	48 (39.7)
Although ergonomics is beneficial to improve student health, but it cost more money than what saves.	36 (29.8)	40 (33.1)	45 (37.2)
Keeping the shoulders relaxed could cause musculoskeletal disorders.	79 (65.3)	13 (10.7)	29 (24.0)
MSDs may be caused by grasping small instruments for long periods.	61 (50.4)	15 (12.4)	45 (37.2)
Frequent lifting of heavy equipment at work contribute to MSDs.	93 (76.9)	6 (5.0)	22 (18.2)

The attitude of students towards ergonomic principles is shown in Table 4. The study revealed that 44.6% of students supported integrating ergonomics education into the curriculum. However, 33.1% preferred bending their heads forward rather than adjusting their workspace. Concerning work practices, 47.9% agreed with equal work distribution, while 31.4% were neutral about bending their backs. A notable 36.4% disagreed with prolonged static postures, and opinions were split on forceful hand movements (28.1% agreement and disagreement). A majority (58.7%) strongly agreed with the benefits of stretching and walking for productivity, and 43.0% agreed with avoiding prolonged angled elbow contact.

Table 4: Students' Attitude on Ergonomic Principles (N=121)

Statement	n (%)				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Ergonomics education must be a part of Allied Health Sciences curriculum.	33(27.3)	54(44.6)	31(25.6)	2(1.7)	1(0.8)
I prefer to bend my head forward instead of adjusting the workspace for better viewing.	4(3.3)	30(24.8)	26 (21.5)	40(33.1)	21(17.4)
It is important to distribute the work equally between us because it makes the work easier.	53(43.8)	58(47.9)	9 (7.4)	1(0.8)	-
Always I should bend my back while working because it makes my work easier.	6(5.0)	31(25.6)	38 (31.4)	32(26.4)	14(11.6)
To finish my work on time, I prefer to attain the same position (e.g., Sitting) for long periods while working instead of changing my posture.	11(9.1)	24(19.8)	19 (15.7)	44(36.4)	23(19.0)
Forceful hand movements while working enables me get work done on time regardless of the consequences that may occur.	7(5.8)	34(28.1)	33 (27.3)	34(28.1)	13(10.7)
Doing exercises like stretching, walking etc. are important to be more productive at work.	71(58.7)	42(34.7)	7 (5.8)	1(0.8)	-
I should always try to avoid putting my angled elbow in direct contact with the work surface for a long period.	26(21.5)	52(43.0)	37 (30.6)	4(3.3)	2 (1.7)

With regard to practice, as shown in Table 5, students largely reported positive ergonomic practices regarding footwear (72.7% comfortable shoes) and legroom (64.5% sufficient space). However, significant gaps were observed. 43.8% occasionally experienced pressure from sharp edges, and 50.4% did not consistently work from a comfortable position. Arm positioning practices were also inconsistent, with 39.7% sporadically avoiding high arm positions and 38.0% seldom avoiding wrist twisting.

Table 5: Students' Practice on Ergonomic Principles (N=121)

Statement	n (%)		
	Yes	Some-time	No
When you are working at the standing position, do you wear comfortable shoes?	88(72.7)	30 (24.8)	3(2.5)
Do you find enough space to put your legs and feet in a comfortable position?	78(64.5)	41(33.9)	2(1.7)
Are your hands or arms subjected to pressure from sharp edges on work surfaces?	28(23.1)	53(43.8)	40(33.1)
Do all task requirements are visible from comfortable positions?	54(44.6)	61(50.4)	6(5.0)
Do you avoid raising your arm above your elbow level while you are working?	36(29.8)	48(39.7)	37(30.6)
Do you avoid twisting or bending your wrist?	36(29.8)	46(38.0)	39(32.2)
Do you stop after at least 15 minutes for a moment to relax your eyes and neck?	28(23.1)	59(48.8)	34(28.1)
Do you stop every 30-60 minutes to get up to stretch and move?	50(41.3)	48(39.7)	23(19.0)
While you are holding objects (e.g., Pencils), do you alternate between your fingers holding them?	39(32.2)	37(30.6)	45(37.2)

Based on Table 6, the correlation analysis revealed a significant relationship between knowledge and attitude ($p = 0.001$), suggesting that students with greater ergonomic knowledge were more likely to hold positive perceptions about its importance. In contrast, no significant correlations were found between knowledge and practice ($p = 0.682$) or attitude and practice ($p = 0.271$), reinforcing the observation that while students acknowledge the value of ergonomics, they may struggle to integrate these practices into their daily routines

Table 6: Correlation Between KAP Towards Ergonomic Principles (N = 121)

Variables	Correlation coefficient, r	p-value
Knowledge - Attitude	0.293	0.001
Knowledge - Practice	-0.038	0.682
Attitude - Practice	0.101	0.271

Discussion

This study revealed that 52.9% demonstrated poor knowledge, while 47.1% showed good knowledge. This finding aligns with previous studies among dental professionals and students, where knowledge scores ranged from approximately 52% to 53% (Kalghatgi et al., 2014; Almosa & Zafar, 2019), suggesting a common issue across healthcare education.

From an Islamic standpoint, this gap in knowledge and its practical consequences raise concerns regarding *ḥifẓ al-nafs*—the preservation of human life and well-being—one of the core objectives of *Maqāṣid al-Sharīʿah*. Islam strongly emphasises preserving health as a form of worship and trust (*amānah*) bestowed by Allah. The Prophet Muhammad ﷺ said: "There are two blessings which many people lose: (They are) health and free time for doing good" (*Ṣaḥīḥ al-Bukhārī*, 6412). This hadith underscores the importance of proactive health preservation, which ergonomics inherently supports by preventing musculoskeletal injuries and promoting comfort in daily tasks.

Research on ergonomic knowledge among Malaysian students is limited, potentially contributing to lower awareness. Consistent with Alwahaibi et al. (2022), this study found that 46.3% of participants understood the definition of ergonomics, 47.1% recognized its benefits, and 50.4% were aware of associated health hazards. These results highlight regional differences in ergonomic knowledge, as evidenced by lower awareness levels in Egypt (Almosa & Zafar, 2019). The observed lack of ergonomic awareness may stem from inadequate educational exposure, limited practical training, and insufficient emphasis on clinical relevance. Prior research supports this, with studies showing that many students have not attended MSD workshops or had ergonomics integrated into their curriculum (Khan & Chew, 2013). Furthermore, while acknowledging their knowledge gaps, some students do not prioritise addressing them (Moosa & Bhayat, 2022). Even when students possess theoretical knowledge, they often struggle with practical application in clinical settings due to insufficient training (Garbín et al., 2014).

The Qurʾanic concept of *al-Mīzān* (balance) is central to understanding the physical and spiritual dimensions of ergonomics. Allah declares in the Qurʾan:

"And the sky He raised and imposed the balance (*mīzān*), so that you do not transgress the balance"

(Sūrah al-Raḥmān, 55:7–8).

This verse reminds believers of the divine order and balance that should be mirrored in human conduct. When implemented correctly, ergonomics maintains this balance between human effort and physical capacity, avoiding harm and inefficiency. The absence of ergonomic knowledge can disrupt this balance, leading to physical strain and long-term health deterioration. Nevertheless, most KAHS IIUM Kuantan students (75.2%) demonstrated positive attitudes toward ergonomics, aligning with the study's expectation of favourable beliefs. This finding is consistent with other studies showing high positive attitudes among students (Senior & Burrell, 2021; Kousar et al., 2022). Such positivity could be linked to the Islamic principle of *wasatiyyah*, moderation and balanced living. Allah says:

"And thus We have made you a justly balanced nation (ummatan wasaʿatan)"

(Sūrah al-Baqarah, 2:143).

A moderate, well-balanced life involves responsible behaviour toward one's body, environment, and duties. Positive attitudes towards ergonomics reflect an appreciation of this principle, even if knowledge and implementation remain areas for growth. Postgraduate students, likely due to increased clinical exposure to MSDs, tend to exhibit even more positive attitudes (Kalghatgi et al., 2014). Specifically, a significant proportion of students supported integrating ergonomics education into the curriculum (44.6%), recognized the importance of equal workload distribution (47.9%), and acknowledged the benefits of stretching and walking for productivity (58.7%). These results are supported by studies highlighting strong student support for ergonomics education and workload management (Alwahaibi et al., 2022; Movahhed et al., 2016). Besides, education is crucial in shaping positive attitudes toward ergonomics, potentially leading to better adherence to ergonomic practices. According to Liu et al. (2022), self-control contributes to the link between psychological well-being and attitudes toward physical activity. Thus, education imparts knowledge and fosters self-regulation, enhancing positive attitudes.

Next, this study found that 56.2% of students demonstrated poor ergonomic practices, compared to 43.8% with good practices. This aligns with findings by El-Sallamy et al. (2017), who reported that 95.4% of students had poor practices despite positive attitudes. This gap between knowledge and implementation suggests that understanding ergonomics does not guarantee its application. Similarly, despite their theoretical knowledge, Borbon (2023) noted discomfort among dental students during clinical practice. Specific ergonomic behaviours varied.

While most students reported wearing comfortable footwear (72.7%) and having sufficient legroom (64.5%), consistent adherence to these practices was lower (24.8% and 33.9%, respectively). Break practices were also inconsistent, with 41.3% frequently taking stretch breaks, but 48.8% irregularly taking short eye and neck breaks. This inconsistency reflects findings by Jaafar et al. (2020), who observed that engineering students often failed to apply ergonomic principles despite basic awareness. Such inconsistencies highlight the need for comprehensive ergonomic training to prevent absenteeism, exhaustion, and decreased productivity. Furthermore, 43.8% of students reported experiencing pressure from sharp edges on work surfaces. Other practices, such as maintaining comfortable task visibility (50.4%), avoiding high arm positions (39.7%), minimizing wrist twisting (38.0%), and taking eye/neck breaks (48.8%), were inconsistently followed. This aligns with Garcia et al. (2018), who noted a struggle to apply ergonomic knowledge in practice. Partido et al. (2020) further emphasised this knowledge-practice mismatch, observing poor posture during dental procedures despite training. This highlights the need for ongoing training and reinforcement to bridge the gap between knowledge and practice, ultimately improving working conditions. In addition, this inconsistency raises concerns not only from an academic or health standpoint but also a spiritual and ethical one. Islam teaches that knowledge must be followed by action. The Prophet ﷺ stated:

"The feet of the son of Adam shall not move on the Day of Judgment until he is asked about... his knowledge and what he did with it" (Tirmidhi, 2417). Thus, failing to implement known ergonomic principles can be seen as a missed opportunity to fulfil the ethical duty of applying beneficial knowledge in daily life.

Regarding the correlation result, this study found a weak positive correlation between students' ergonomic knowledge and attitudes, suggesting that higher knowledge is associated with more favourable attitudes. However, students generally showed positive attitudes despite relatively low knowledge levels, a finding consistent with other research. Factors beyond knowledge, such as personal experiences of discomfort and the educational environment, significantly influence attitudes. Experiencing discomfort from poor posture can increase the perceived value of ergonomics. Integrating ergonomic concepts into the curriculum also fosters positive attitudes. However, habitual poor postures, especially during online classes, may hinder the effective adoption of ergonomic principles.

However, this study revealed no significant correlation between ergonomic knowledge and practice, indicating that knowledge does not automatically lead to better practices. Factors like limited resources, insufficient training, and low motivation may contribute to this disconnect. Research highlights the importance of early and comprehensive ergonomic training to bridge this gap and improve adherence, preventing issues like absenteeism and reduced productivity. Lastly, there is no significant correlation between ergonomic attitudes and practices, suggesting that positive attitudes do not guarantee good practices. This aligns with findings that students often fail to implement ergonomic practices despite favourable views and knowledge. Factors contributing to this disconnect include limited resources, lack of faculty support, and the perceived theoretical nature of ergonomic education. Practical, hands- on training is crucial to bridge the gap between positive attitudes and effective implementation, as theoretical knowledge alone does not ensure behavioural change.

This study highlights a disconnect between ergonomic knowledge, attitudes, and practices, emphasizing the need for improved education. Integrating practical training from early education stages is crucial for effective application, supported by providing resources like ergonomic workstations. Motivation is key to translating knowledge and attitudes into practice. Addressing demotivation, caused by delayed consequences or heavy workloads, requires habit-forming strategies and consistent feedback. Bridging this divide requires a holistic approach integrating Islamic ethics, educational strategy, and practical exposure. Motivation, self-regulation, and consistency must be cultivated values deeply rooted in Islamic teaching. Allah reminds us:

"Indeed, Allah will not change the condition of a people until they change what is in themselves"

(Sūrah al-Ra'd, 13:11).

This study has several limitations. First, the use of a convenience sampling method restricts the generalizability of findings to other institutions or student populations. Second, the reliance on self-reported data introduces potential bias, such as social desirability and recall bias. Participants may have overestimated their ergonomic practices or underreported behaviours due to perceived expectations. Moreover, the cross-sectional nature of the study does not allow

for causal inferences between knowledge, attitude, and practice. Future studies should consider longitudinal or experimental designs and include a more diverse sample across multiple universities.

Conclusion

This study found that a majority of KAHS IIUM Kuantan undergraduate students had poor ergonomic knowledge (52.9%) and practices (56.2%), while demonstrating positive attitudes (75.2%). The low knowledge levels differed from some prior studies, potentially due to population differences. A weak positive correlation existed between knowledge and attitudes, suggesting that higher knowledge leads to more favourable attitudes. However, positive attitudes were observed despite low knowledge, indicating the influence of personal experiences and education. No significant correlation was found between knowledge and practice or attitudes and practice, possibly due to sociodemographic or external factors. Further research should investigate these factors to develop targeted interventions. To conclude, this study emphasises the importance of ergonomic education among Allied Health Sciences students. From an Islamic perspective, the findings of this study underscore the relevance of foundational values such as *ḥifẓ al-nafs* (preservation of life and well-being), *al-mīzān* (balance), and *wasatiyyah* (moderation) in shaping educational and occupational practices. These values advocate carefully managing one's physical capacity and cultivating habits that reflect a balanced and mindful approach to daily responsibilities. Islam emphasises maintaining harmony in all aspects of life, including physical, mental, and spiritual aspects. Universities should consider implementing ergonomic training sessions and creating study environments that facilitate healthy postural habits.

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