University professors' quality of life and posture during the COVID-19 pandemic

Qualidade de vida e postura de professores universitários durante a pandemia de COVID-19

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Abstract

Introduction: The COVID-19 pandemic led to adaptations in educational settings, such as replacing in-person with online classes. Hence, teachers increased their screen time, posing a greater risk to their mental health, quality of life, and body posture. **Objective:** To assess and correlate the quality of life and body posture of higher education faculty during the COVID-19 pandemic. **Methods:** This exploratory research initially contacted participants via digital invitations during the pandemic. Volunteers answered an online questionnaire with data on eligibility criteria and were later assessed regarding their quality of life (SF-36) and postural biomechanics (SAPO software). The variables in question were correlated regarding sex and age ranges with Spearman's correlation, setting the significance level at 5%. **Results:** The sample had 21 professors of both sexes, aged 26 to 62 years (mean age of 38.47 years; SD = 8.53). The females' mean age was 40.27 years (SD = 8.47) and that of males was 33.83 years (SD = 7.38). Males had a greater correlation between cervical spine issues and mental and physical domains, while females had body posture changes and a moderate correlation mainly with physical quality-of-life domains. **Conclusion:** There was a correlation between body posture and quality of life in higher education faculty during the COVID-19 pandemic.

Keywords: COVID-19. Faculty. Posture. Quality of Life.

Resumo

Introdução: *A pandemia de COVID-19 gerou adaptações nos ambientes pedagógicos, como alteração das aulas presenciais para online. Em consequência, estar em maior tempo frente às telas aumentou o risco à saúde mental, qualidade de vida e postura corporal dos professores.* ***Objetivo:*** *Avaliar e correlacionar a qualidade de vida e a postura corporal de professores do ensino superior durante o período de pandemia de COVID-19.* ***Métodos:*** *Pesquisa exploratória na qual foi realizado contato inicial por meio de convites digitais durante a pandemia. Os voluntários responderam a um questionário online com dados sobre critérios de elegibilidade e posteriormente foram avaliados quanto à qualidade de vida (SF-36) e biomecânica postural (software SAPO). Foram correlacionadas as variáveis em questão quanto ao sexo e faixa etária, através da correlação de Spearman, sendo considerado nível de significância de 5%.* ***Resultados:*** *A amostra ficou constituída de 21 professores do ensino superior, de ambos os sexos e faixa etária entre 26 e 62 anos (média de idade de 38,47 anos e DP = 8,53). Entre as mulheres, a média de idade foi de 40,27 anos (DP = 8,47) e entre os homens foi de 33,83 anos (DP = 7,38). O sexo masculino apresentou maior correlação relacionada às questões de coluna cervical com domínios mentais e físicos, enquanto o feminino demonstrou alteração na postura corporal e correlação moderada principalmente com os domínios físicos da qualidade de vida.* ***Conclusão:*** *Houve correlação entre postura corporal e qualidade de vida de professores do ensino superior durante a pandemia de COVID-19.*

Palavras-chave: *COVID-19. Docentes. Postura. Qualidade de vida.*

Introduction

The COVID-19 pandemic transformed people's routines and lifestyles. The epicenter of coronavirus dissemination was Wuhan, China, in late 2019, causing severe acute respiratory syndrome (SARS-CoV-2). The measures taken worldwide to stop the virus spread included closing borders, implementing social isolation and distancing, and keeping open only essential services. Thus, various segments of society were affected, including the educational system, which had to restructure its work.[1-3]

All educational levels had to readjust, changing in-person to online classes as schools and universities were temporarily closed. The pandemic reached Brazil in March 2020, when the school year was just beginning in higher education institutions, with no return to normality in the foreseeable future. Hence, to avoid halting education altogether, the teaching process abruptly changed from in-person to remote classes.[4] The Ministry of Education authorized replacing in-person classes with online ones while the new coronavirus pandemic lasted.[5]

As educational institutions adapted their teaching models to ensure the students' rights and access to education, professors started working from home.[6] They had not only to cope with anxiety and the fear of the unknown due to the pandemic but also conciliate family activities (home chores increased as more people spent more time at home) with occupational ones in the same space.

Thus, professors' illnesses, which were already perceived at schools,[7] were potentialized with the new adjustment demands, potentially posing a risk to their mental and physical health and quality of life. Moreover, this new configuration weakened social interaction as relationships were mediated exclusively via technology.

At the same time, the need to use digital learning and Internet resources forced professors to suddenly develop skills and competence to prepare and teach online classes,[8-10] further intensifying their workday and workload.[10] As corroborated by an International Labour Organization document,[11] the workforce increased, and labor intensified as its pace hastened and the workday got longer.

Studies carried out years before the pandemic indicate that these professionals' main causes of leaves of absence include stress, anxiety, depression, and fatigue.[12] Others report indications of the aggravation and/or onset of diseases such as voice disorders, musculoskeletal disorders, and especially mental and physical health problems due to professors' activities.[6,10] The changes caused by COVID-19, besides directly impacting professors' work form, intensity, and place, triggered aggravations in their physical and emotional distress. Physical distress included static postural changes – which are considered a public health issue, especially regarding potential predisposing factors for degenerative pathologies in adults' vertebral columns. These physical changes can be directly related to

one's lifestyle and quality of life and, depending on their magnitude, can result in some type of disability to do activities of daily living.[13-17] Emotions, in their turn, are impacted by negative consequences to the population's mental health, particularly psychological suffering and symptoms related to depression, anxiety, and stress.[18] During this period, ergonomics became even more important because most homes were not initially adequate for work. For instance, they lacked and had difficulties obtaining appropriate furniture, which predisposes such people to musculoskeletal disorders due to inadequate posture.[19]

Therefore, the main issue is to learn whether the increased screen time during work along with inadequate physical conditions at home worsens professors' quality of life and posture in the pelvic and shoulder girdles and the body in general. This is a valid search, as there is a great commitment to the quality of education provided by and required from higher education institutions. Both men and women are believed to be susceptible to changes – however, given overloaded activities, women may be even more affected. It is also hypothesized that older professors have greater difficulties coping with adaptations.

Hence, this study aimed to assess and correlate professors' quality of life and body posture during the COVID-19 pandemic.

Methods

This field, quantitative, prospective, cross-sectional, analytical research was conducted at the Oral-Motor Control Laboratory at the Federal University of Santa Maria (UFSM). It belongs to a greater umbrella project approved by the institution's Research Ethics Committee (CEP/UFSM no. 5.071.236). All participants signed an informed consent form.

The study approached professors of both sexes who taught in public and private higher education institutions in Santa Maria, Rio Grande do Sul, and nearby towns. They were invited via e-mail and the laboratory's social media, encouraging them to participate in the study. Recruitment took place from September 2021 to July 2022, when those who showed interest in participating answered a questionnaire in Google Forms for them to be contacted later. Hence, the sample was recruited by convenience.

The sample inclusion criteria were being professors, older than 18 years, and fully answering all questionnaires. The exclusion criteria were having a body mass index (BMI) lower than 18 or higher than 29.9; undergoing physical therapy; having a history of vertebral column surgery; being diagnosed with or self-reporting signs suggestive of cervical spine degenerative diseases; having signs suggestive of craniofacial and neurological syndromes; being an athlete in any sports modality, training high performance daily, and participating in professional competitions.

The professors' professional profile was assessed with a questionnaire developed by the authors, addressing the following descriptive variables: data on identification, age, sex, educational institution to which they belong, department to which their course belongs, teaching modality, physical activity, marital status, and weekly workload. They self-reported their body mass and height, with which the researchers calculated the BMI in kg/m², using the reference values established by the World Health Organization (WHO).[20]

Different assessors blind to the other evaluations assessed the sample in person between October 2021 and July 2022. The researchers also applied the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36)[21] and the Postural Analysis Software assessment instrument (SAPO). The professors answered SF-36 to assess their quality of life. This quality-of-life assessment instrument is easy to administer and understand. It is a multidimensional questionnaire with 36 items, encompassing eight domains: physical functioning (10 items), physical role functioning (four items), bodily pain (two items), general health perceptions (five items), vitality (four items), social role functioning (two items), emotional role functioning (three items), mental health (five items), and one more assessment question comparing the current with the previous year's health status. Values range from 0 to 100 – the higher the score, the better the quality of life. This instrument was used to investigate the overall health-related quality of life, with no specific concepts regarding ages, diseases, or treatment groups.

Body posture was assessed with photographs, as recommended by SAPO, v 0.68®, which was used in biomechanical postural analyses. Hence, the professors were photographed in orthostatic posture, barefoot, wearing clothes that facilitated body visualization (swimsuits or gym clothes), with front view, left side view, and

back view photographs. As required by the software, measures were calibrated based on a plumb line hanging from the ceiling, with two Styrofoam markers placed 1 meter apart on the line. Data were collected with no further instructions or reminders regarding posture. Markers were placed in anatomical reference points previously palpated and identified by the examiner. These points/references in the bones, which guided angle calculations, were marked with Styrofoam balls, as instructed in the SAPO protocol. This assessment was performed by duly trained and calibrated examiners to analyze body posture axes. Moreover, the quality-of-life and posture examiners were mutually blind to avoid collection bias and differences in the collection and analysis processes.

After taking the photographs, they were transferred to a computer for posterior photogrammetric body posture analysis. The angles between the anatomical points were automatically quantified according to the protocol, following software conventions. The following points were used in this study for having a greater relationship with the ergonomic issues it addressed: horizontal head alignment (HHA), horizontal acromion alignment (HAA), horizontal anterior superior iliac spine alignment (HISA), right hip angle (RHA), left hip angle (LHA), horizontal head alignment considering C7 (HHA-C7), cervical head alignment (CHA), vertical trunk alignment (VTA), hip angle considering the trunk and thighs (HA-TT), vertical body alignment (VBA), horizontal pelvic alignment (HPA), and knee angle (KA).

Data analysis

Collected data were tabulated for statistical analysis in an Excel database, using SPSS (Statistical Package for the Social Sciences), version 26.0 (IBM Corporation, Armonk, NY, EUA). The normality of data distribution was verified with the Shapiro-Wilks test. Data were descriptively presented (mean, standard deviation, and absolute and reference values) and correlated with Spearman's test.

Quality-of-life variables were correlated with posture according to the professors' sex and age (under 44 and above 45 years old). Relationships with r values above 0.9 were interpreted as very strong; between 0.7 and 0.9, as strong; between 0.5 and 0.7, as moderate; and between 0.3 and 0.5, as weak. The significance level was set at 5% ($p < 0.05$).

Results

Altogether, 34 questionnaires were answered, excluding those that met the exclusion criteria. The final sample comprised 21 professors of both sexes (six males and 15 females), aged 26 to 62 years (mean of 38.47 years; SD = 8.530). The women's mean age was 40.27 years (SD = 8.47), and the men's was 33.83 years (SD = 7.38). The mean BMI was 24.25 (SD = 2.35). Volunteers were excluded due to BMI above 29.9 (two subjects); lacking more than two molar teeth (two subjects); undergoing treatment at the time with myorelaxant drugs, analgesics, and/or antibiotics (two subjects); having a history of face trauma (two subjects); having a systemic disease such as arthritis or arthrosis (three subjects).

Professors participating in the study had a bachelor's degree in a single field and taught classes on social communication (n = 1; 5%), physics (n = 1; 5%), speech-language-hearing sciences (n = 3; 15%), statistics (n = 1; 5%), meteorology (n = 1; 5%), chemistry (n = 4; 20%), medicine (n = 1; 5%), biology (n = 2; 10%), pedagogy (n = 1; 5%), electrical engineering (n = 1; 5%), physical therapy (n = 1; 5%), physical education (n = 1; 5%), chemical engineering (n = 1; 5%), and civil engineering (n = 1; 5%). The main research characterization variables are shown in Table 1.

Of the study participants, 33 (97.1%) agreed that their screen time had increased during the pandemic, and 27 (79.4%) agreed that cervical pain had worsened with the increased screen time. Table 2 shows data on quality of life and their comparison per sex and age range. Table 3 presents data on postural analysis and their comparison per sex and age range. Data on the correlation between the sample's quality of life and body posture per sex and age range are respectively shown in Tables 4 and 5.

Discussion

It is important to first learn some things about the profile in this study sample and analyze whether these professors reflect the profiles found in other Brazilian states and abroad. Females prevailed in this study, and most professors were married. In studies conducted in Chile by Lizana and Vega-Fernadez[22] and Lizana et al.,[23] the samples likewise comprised mostly women – respectively, 79% and 71%, with 336 and 63 professors, and a mean age of 37.5 ± 10.7 years for both sexes.

Table 1 - Distribution of the characterization of the sample per sex and age range

Variables	Sex		Age range		Total sample
	Male (n = 6)	Female (n = 15)	< 44 years (n = 17)	> 45 years (n = 4)	
Weight (mean, SD, kg)	73.08 (7.00)	65.78 (6.54)	68.96 (6.85)	59.90 (4.15)	67.70 (7.24)
Height (mean, SD, m)	1.76 (0.05)	1.64 (0.04)	1.67 (0.07)	1.63 (0.01)	1.67 (0.07)
BMI (mean, SD)	23.60 (1.52)	24.46 (2.58)	22.44 (1.32)	59.90 (4.15)	24.29 (2.41)
Marital status – n (%)					
Married	4 (66.70)	8 (53.30)	9 (52.90)	3 (75.00)	12 (57.10)
Single	2 (33.30)	3 (20.00)	5 (29.40)	-	5 (23.80)
Others	-	4 (26.70)	3 (17.60)	1 (25.00)	4 (19.00)
Work modality - n (%)					
Online	3 (50.00)	-	2 (11.80)	1 (25.00)	3 (14.30)
In-person	-	5 (33.30)	5 (29.40)	-	5 (23.80)
Blended	3 (50.00)	10 (66.70)	10 (58.80)	3 (75.00)	13 (61.90)
Institution n (%)					
Public	6 (100)	13 (86.70)	15 (88.20)	4 (100)	19 (90.50)
Private	-	1 (6.70)	1 (5.90)	-	1 (4.80)
Both	-	1 (6.70)	1 (5.90)	-	1 (4.80)
Departaments/areas - n (%)					
Health	1 (16.70)	5 (33.30)	4 (23.50)	2 (50.00)	6 (28.6)
Exact Sciences	3 (50.00)	9 (60.00)	10 (58.80)	2 (50.00)	12 (57.1)
Humanities	2 (33.30)	-	2 (11.80)	-	2 (9.5)
Education	-	1 (6.70)	1 (5.90)	-	1 (4.80)
TIP (mean, SD, years)	6.82 (6.20)	8.33 (5.50)	6.65 (5.00)	15.33 (0.57)	7.95 (5.59)
DWL (mean, SD, years)	8.00 (0.00)	7.73 (1.98)	8.67 (4.25)	8 (0.00)	8.57 (3.90)
Physical activity - n (%)					
0 days/week	1 (20.00)	4 (26.7)0	5 (29.40)	-	5 (25.00)
2 days/week	1 (20.00)	-	1 (5.90)	-	1 (5.00)
3 days/week	-	2 (13.30)	1 (5.90)	1 (33.30)	2 (10.00)
4 days/week	-	1 (6.70)	1 (5.90)	-	1 (5.00)
5 days/week	3 (60.00)	3 (20.00)	5 (29.40)	1 (33.30)	6 (30.00)
6 days/week	-	1 (6.70)	-	1 (33.30)	1 (5.00)
7 days/week	-	4 (26.70)	4 (23.50)	-	4 (20.00)
Physical exercise - n (%)					
0 days/week	1 (20.00)	7 (46.70)	7 (41.20)	1 (33.30)	8 (40.00)
2 days/week	1 (20.00)	2 (13.30)	1 (5.90)	2 (66.70)	3 (15.00)
3 days/week	1 (20.00)	4 (26.70)	5 (29.40)	-	5 (25.00)
4 days/week	1 (20.00)	-	1 (5.90)	-	1 (5.00)
5 days/week	1 (20.00)	1 (6.70)	2 (11.80)	-	2 (10.00)
7 days/week	-	1 (6.70)	1 (5.90)	-	1 (5.00)

Note: SD = standard deviation; TIP = time in the profession; DWL = daily workload.

Table 2 - Distribution (mean and standard deviation) and comparison of quality-of-life scores per sex and age ranges

Variables	Sex		p-value	Age range		p-value
	Male (n = 6)	Female (n = 15)		< 44 years (n = 17)	> 45 years (n = 4)	
Physical domains						
Physical functioning	94.14 (9.70)	81.67 (10.46)	0.02b*	85.59 (12.36)	83.75 (8.53)	0.78[b]
Physical role functioning	83.33 (40.82)	88.33 (31.14)	0.79*	89.71 (29.39)	75.00 (50.00)	0.46[a]
Bodily pain	76.16 (20.02)	60.50 (17.80)	0.09[b]	66.26 (19.88)	59.50 (18.44)	0.54[b]
General health perceptions	81.00 (16.09)	72.94 (18.32)	0.35[b]	75.24 (16.78)	75.25 (24.26)	0.99[b]
Mental domains						
Mental health	71.33 (12.24)	70.67 (19.28)	0.69[a]	71.29 (12.90)	69.00 (33.04)	0.52[a]
Vitality	70.00 (10.48)	54.67 (19.31)	0.09[a]	61.76 (13.80)	47.50 (32.01)	0.41[a]
Social role functioning	83.33 (18.81)	74.25 (24.21)	0.47[a]	81.69 (18.15)	56.25 (31.45)	0.08[a]
Emotional role functioning	77.76 (40.37)	75.46 (11.64)	0.75[a]	76.38 (32.87)	75.00 (50.00)	0.79[a]
Overall scores	79.63 (13.30)	72.01 (11.64)	0.20	75.99 (11.09)	66.56 (16.07)	0.17

Note: [a]Analysis with the Mann-Whitney U test; [b]Analysis with the t-test; *Statistical significance.

Table 3 - Distribution (mean and standard deviation) and comparison of postural scores per sex and age ranges

Variables	Sex		p-value	Age range		p-value
	Male (n = 6)	Female (n = 15)		< 44 years (n = 17)	> 45 years (n = 4)	
HHA	0.50 (3.02)	0.85 (3.10)	0.81[b]	0.88 (2.96)	0.17 (3.59)	0.68[b]
HAA	0.30 (1.61)	0.50 (1.51)	0.29[b]	0.02 (1.54)	1.55 (0.71)	0.06b
HISA	2.03 (3.13)	0.66 (2.92)	0.35[b]	0.79 (3.10)	2.17 (2.33)	0.41[b]
RHA	24.43 (31.26)	17.38 (17.47)	0.81[a]	19.99 (21.34)	16.85 (26.16)	0.24[a]
LHA	20.18 (22.97)	13.44 (15.77)	0.58[a]	14.91(17.49)	17.27 (21.61)	0.78[a]
HHA-C7	50.75 (5.53)	51.73 (5.83)	0.72[b]	51.88 (6.11)	49.60 (2.47)	0.47[b]
CHA (acromion)	16.68 (5.46)	10.82 (6.80)	0.07[b]	12.41 (7.46)	12.85 (4.15)	0.91[b]
VTA	5.46 (3.58)	6.96 (3.66)	0.40[b]	6.91 (3.23)	4.90 (5.19)	0.32[b]
HA-TT	8.08 (5.95)	9.04 (5.97)	0.33[b]	9.19 (5.68)	6.97 (7.06)	0.50[b]
VBA	2.05 (1.20)	0.67 (2.21)	0.17[b]	0.67 (1.68)	2.72 (2.89)	0.07[b]
HPA	4.98 (7.32)	12.43 (12.05)	0.04[a]*	11.69 (8.75)	4.40 (19.52)	0.65[a]
KA	9.40 (6.90)	7.70 (4.19)	0.49[b]	7.15 (4.33)	12.57 (5.80)	0.04[b]*

Note: HHA = horizontal head alignment; HAA = horizontal acromion alignment; HISA = horizontal anterior superior iliac spine alignment; RHA = right hip angle; LHA = left hip angle; HHA-C7 = horizontal head alignment considering C7; CHA = cervical head alignment; VTA = vertical trunk alignment; HA-TT – hip angle considering the trunk and thighs; VBA = vertical body alignment; HPA = horizontal pelvic alignment; KA = knee angle. [a]Analysis with the Mann-Whitney U test; [b]Analysis with the t-test; *Statistical significance.

Table 4 - Distribution of the correlation between quality of life and body posture per sex

Variables		Physical domains				Mental domains				OS
		PF	PRF	Pain	GHP	MH	VT	SRF	ERF	
HHA	M	0.06 r = -0.78	0.15 r = -0.66	0.000* r = -0.98	0.21 r = -0.58	0.57 r = -0.29	0.001* r = -0.97	0.005* r = -0.93	0.79 r = -0.13	0.008* r = - 0.92
	F	0.04* r = -0.53	0.71 r = -0.10	0.04* r = -0.52	0.27 r = 0.30	0.98 r = -0.00	0.28 r = -0.29	0.29 r = -0.29	0.23 r = 0.325	0.55 r = - 0.16
HAA	M	0.09 r = -0.74	0.80 r = -0.13	0.14 r = -0.67	0.000* r = -0.98	0.70 r = -0.20	0.17 r = -0.63	0.47 r = -0.37	0.03* r = -0.84	0.11 r = -0.71
	F	0.23 r = 0.32	0.98 r = -0.00	0.58 r = -0.15	0.99 r = -0.00	0.06 r = 0.49	0.93 r = 0.02	0.66 r = 0.12	0.80 r = -0.71	0.93 r = 0.02
HISA	M	0.03* r = -0.83	0.44 r = 0.39	0.054 r = -0.79	0.10 r = - 0.72	0.39 r = -0.42	0.12 r = -0.69	0.13 r = -0.67	0.26 r = -0.54	0.01* r = - 0.88
	F	0.65 r = 0.12	0.98 r = -0.00	0.77 r = -0.08	0.67 r = - 0.11	0.70 r = -0.10	0.92r = 0.02	0.16 r = 0.37	0.45 r = -0.21	0.93 r = 0.02
RHA	M	0.47 r = 0.37	0.44 r = 0.39	0.73 r = 0.17	0.82 r = 0.11	0.07 r = -0.77	0.70 r = 0.20	0.95 r = 0.03	0.94 r = 0.03	0.87 r = 0.08
	F	0.79 r = 0.07	0.66 r = 0.12	0.50 r = 0.18	0.53 r = -0.17	0.66 r = 0.12	0.97 r = 0.00	0.45 r = 0.21	0.71 r = 0.10	0.48 r = 0.19
LHA	M	0.18 r = 0.62	0.15 r = 0.66	0.46 r = 0.37	0.78 r = 0.14	0.12 r = -0.69	0.55 r = 0.30	0.65 r = 0.23	1.00 r = 0.00	0.49 r = 0.34
	F	0.01* r = 0.59	0.62 r = 0.13	0.20 r = 0.18	0.49 r = -0.19	0.34 r = 0.26	0.055 r = 0.50	0.18 r = 0.36	0.39 r = 0.23	0.11 r = 0.42
HHA-C7	M	0.47 r = 0.37	0.44 r = 0.39	0.09 r = 0.73	0.42 r = 0.40	0.54 r = 0.31	0.50* r = 0.81	0.09 r = 0.74	0.94 r = -0.03	0.20 r = 0.60
	F	0.055r = -0.50	0.83 r = -0.06	0.32 r = -0.27	0.38 r = 0.24	0.53 r = -0.17	0.71 r = 0.10	0.42 r = -0.22	0.29 r = 0.29	0.74 r = 0.02
CHA (cromion)	M	0.63r = -0.24	0.44 r = 0.39	0.65 r = -0.23	0.17 r = - 0.63	0.62 r = -0.25	0.46 r = -0.11	0.77 r = -0.15	0.06 r = -0.77	0.70 r = - 0.20
	F	0.49 r = 0.19	0.39 r = -0.23	0.00* r = 0.68	0.83 r = - 0.05	0.62 r = -0.13	0.71 r = 0.10	0.57 r = 0.15	0.62 r = -0.13	0.91 r = 0.29
VTA	M	0.81 r = 0.12	0.80 r = 0.13	0.57r = -0.29	0.91 r = -0.05	0.46 r = -0.37	0.25 r = -0.55	0.28r = -0.52	0.84 r = 0.10	0.87 r = -0.08
		0.51 r = 0.18	0.02* r = 0.59	0.76 r = -0.08	0.04* r = 0.52	0.46 r = 0.20	0.62 r = 0.13	0.99 r = 0.00	0.53 r = 0.17	0.09 r = 0.45
HA-TT	M	0.81 r = -0.12	0.80 r = -0.13	0.24 r = -0.55	0.70 r = -0.20	0.39 r = -0.42	0.08 r = -0.75	0.09 r = -0.74	0.84 r = 0.10	0.46 r = -0.37
	F	0.83 r = 0.05	0.03* r = 0.53	0.77 r = 0.08	0.00* r = 0.71	0.82 r = 0.06	0.38 r = 0.24	0.86 r = -0.04	0.52 r = 0.17	0.08 r = 0.45
VBA	M	0.51 r = 0.33	0.80 r = -0.13	0.86 r = 0.08	0.25 r = 0.55	0.54 r = 0.31	0.82 r = -0.11	0.72 r = -0.18	0.14 r = 0.67	0.54 r = 0.31
	F	0.09 r = 0.45	0.96 r = 0.01	0.28r = -0.29	0.51 r = -0.18	0.11 r = 0.42	0.86 r = 0.04	0.74 r = 0.09	0.65 r = 0.12	0.58 r = 0.15
HPA	M	0.19 r = 0.61	0.15 r = 0.65	0.53 r = 0.32	0.74 r = 0.17	0.07 r = -0.77	0.65 r = 0.23	0.81 r = 0.12	0.94 r = 0.03	0.54 r = 0.31
	F	0.25 r = 0.31	0.23 r = -0.32	0.93 r = 0.02	0.96 r = 0.01	0.03* r = -0.55	0.33 r = 0.26	0.32 r = 0.27	0.09 r = 0.45	0.28 r = 0.29
KA	M	0.19 r = - 0.61	0.15 r = -0.65	0.059 r = -0.79	0.28 r = -0.52	0.95 r = 0.29	0.08 r = -0.75	0.19 r = -0.61	0.94 r = - 0.03	0.11 r = -0.71
		0.97 r = - 0.00	0.19 r = 0.35	0.31 r = 0.27	0.03* r = 0.53	0.68 r = -0.11	0.44 r = 0.21	0.64 r = -0.13	0.75 r = - 0.08	0.47 r = 0.19

Note: PF = physical functioning; PRF = physical role functioning; GHP = general health perceptions; MH = mental health; VT = vitality; SRF = social role functioning; ERF = emotional role functioning; OS = overall score; M = male; F = female; HHA = horizontal head alignment; HAA = horizontal acromion alignment; HISA = horizontal anterior superior iliac spine alignment; RHA = right hip angle; LHA = left hip angle; HHA-C7 = horizontal head alignment considering C7; CHA = cervical head alignment; VTA = vertical trunk alignment; HA-TT – hip angle considering the trunk and thighs; VBA = vertical body alignment; HPA = horizontal pelvic alignment; KA = knee angle; *Statistical significance with Spearman's test.

Table 5 - Distribution of the correlation between quality of life and body posture per age range

Variables		Physical domains				Mental domains				OS
		PF	PRF	Pain	GHP	MH	VT	SRF	ERF	
HHA	< 44 years	0.007* r = -0.62	0.73 r = -0.08	0.001* r = -0.72	0.68 r = 0.10	0.83 r = 0.05	0.05 r = -0.47	0.02* r = -0.52	0.24 r = 0.29	0.27 r = - 0.28
	> 45 years	0.20 r = -0.80	0.22 r = -0.77	1.00 r = 0.00	0.60 r = 0.40	0.20 r = -0.80	0.36 r = -0.63	0.36 r = -0.63	0.74 r = - 0.25	0.20 r = -0.80
HAA	< 44 years	0.56 r = -0.14	0.63 r = -0.12	0.13 r = -0.37	0.16 r = -0.35	0.35 r = 0.24	0.38 r = -0.22	0.75 r = 0.08	0.14 r = -0.37	0.26 r = -0.26
	> 45 years	0.051 r = 0.94	0.18 r = 0.81	1.00 r = 0.00	0.60 r = 0.40	0.20 r = -0.80	0.36 r = -0.63	0.36 r = -0.63	0.74 r = - 0.25	0.20 r = -0.80
HISA	< 44 years	0.56 r = -0.15	0.98 r = -0.00	0.19 r = -0.33	0.03* r = - 0.52	0.99 r = -0.00	0.32 r = -0.25	0.90 r = 0.31	0.07 r = -0.44	0.17 r = - 0.34
	> 45 years	0.60 r = -0.40	0.22 r = -0.77	0.40r = -0.60	0.80 r = 0.20	0.60r = -0.40	0.68 r = -0.31	0.68 r = 0.31	0.74 r = 0.25	0.60 r = - 0.40
RHA	< 44 years	0.44 r = 0.19	0.59 r = 0.14	0.55 r = 0.15	0.38 r = 0.22	0.25 r = -0.29	0.48 r = -0.18	0.49 r = -0.17	0.45 r = 0.19	0.67 r = 0.11
	> 45 years	0.60 r = -0.40	0.22 r = -0.77	0.40 r = -0.60	0.80 r = -0.20	0.60 r = 0.40	0.68 r = 0.31	0.68r = 0.31	0.74 r = -0.25	0.60 r = 0.40
LHA	< 44 years	0.02* r = 0.55	0.46r = 0.18	0.19 r = 0.33	0.79 r = 0.07	0.27 r = -0.27	0.15 r = 0.36	0.41 r = 0.21	0.76 r = 0.08	0.34 r = 0.24
	> 45 years	0.80 r = 0.20	0.22 r = 0.77	1.00 r = 0.00	0.60 r = -0.40	0.80 r = 0.20	0.36 r = 0.63	0.36 r = 0.63	0.74 r = 0.25	0.80 r = 0.20
HHA-C7	< 44 years	0.18 r = -0.33	0.93 r = 0.02	0.39 r = -0.22	0.29 r = 0.27	0.64 r = 0.12	0.24 r = 0.29	0.75 r = -0.08	0.08 r = 0.42	0.66 r = 0.11
	> 45 years	0.78 r = 0.21	0.45 r = 0.54	0.68 r = 0.31	0.051 r = 0.94	0.36 r = -0.63	0.16 r = -0.83	0.16 r = -0.83	0.18r = -0.81	0.36 r = -0.63
CHA (cromion)	< 44 years	0.14 r = 0.37	0.65 r = -0.11	0.07 r = 0.44	0.58 r = - 0.14	0.52 r = -0.16	0.59 r = 0.13	0.67 r = 0.11	0.42 r = -0.20	0.77 r = 0.07
	> 45 years	0.20 r = -0.80	0.74 r = -0.25	0.20 r = 0.80	0.60 r = 0.40	0.00 r = -0.80	0.36 r = -0.63	0.36 r = -0.63	0.22 r = -0.77	0.20 r = -0.80
VTA	< 44 years	0.31 r = 0.26	0.01* r = 0.56	0.76 r = 0.07	0.13 r = 0.37	0.96 r = 0.01	0.51 r = 0.17	0.96 r = -0.01	0.33 r= 0.24	0.08 r = 0.43
	> 45 years	0.80 r = 0.20	0.74 r = -0.25	0.20 r = -0.80	0.60 r = 0.40	0.80 r = -0.20	0.68 r = -0.31	0.68 r = -0.31	0.74 r = 0.25	0.80 r = -0.20
HA-TT	< 44 years	0.97 r = -0.00	0.051 r = 0.48	0.86 r = -0.04	0.23 r = 0.30	0.83 r = 0.05	0.37 r = 0.23	0.92 r = -0.02	0.31 r = 0.25	0.11 r = 0.39
	> 45 years	0.60 r = 0.40	0.74 r = 0.25	0.60 r = -0.40	0.20 r = 0.80	0.60 r = -0.40	0.36 r = -0.63	0.36 r = -0.63	0.74 r = -0.25	0.60 r = -0.40
VBA	< 44 years	0.02* r = 0.54	0.63 r = 0.12	0.33 r = 0.24	0.17 r = 0.34	0.85 r = 0.04	0.69 r = 0.10	0.65 r = 0.11	0.80 r = 0.06	0.31 r = 0.25
	> 45 years	0.20 r = 0.80	0.74 r = 0.25	0.20 r = -0.80	0.60 r = -0.40	0.20 r = 0.80	0.36 r = 0.63	0.36 r = 0.63	0.22 r = 0.77	0.20 r = 0.80
HPA	< 44 years	0.05 r = 0.47	0.55 r = -0.15	0.11 r = 0.39	0.34 r = 0.24	0.75 r = 0.08	0.14 r = 0.37	0.26 r = 0.28	0.54 r = 0.15	0.20 r = 0.32
	> 45 years	0.20 r = 0.80	0.74 r = 0.25	0.20 r = -0.80	0.60 r = -0.40	0.20 r = 0.80	0.36 r = 0.63	0.36 r = 0.63	0.22 r = 0.77	0.20 r = 0.80
KA	< 44 years	0.98 r = 0.00	0.32 r = 0.25	0.97 r = - 0.00	0.81 r = 0.06	0.74 r = -0.08	0.40 r = 0.21	0.91 r = -0.03	0.75 r = - 0.08	0.61 r = 0.13
	> 45 years	0.20 r = 0.80	0.22 r = 0.77	1.00 r = 0.00	0.60 r = 0.40	0.20 r = -0.80	0.36 r = -0.63	0.36 r = -0.63	0.74 r = -0.25	0.20 r = -0.80

Note: PF = physical functioning; PRF = physical role functioning; GHP = general health perceptions; MH = mental health; VT = vitality; SRF = social role functioning; ERF = emotional role functioning; OS = overall score; M = male; F = female; HHA = horizontal head alignment; HAA = horizontal acromion alignment; HISA = horizontal anterior superior iliac spine alignment; RHA = right hip angle; LHA = left hip angle; HHA-C7 = horizontal head alignment considering C7; CHA = cervical head alignment; VTA = vertical trunk alignment; HA-TT – hip angle considering the trunk and thighs; VBA = vertical body alignment; HPA = horizontal pelvic alignment; KA = knee angle; *Statistical significance with Spearman's test.

Other Brazilian studies[6,17] also found a predominance of married women among professors, while yet other ones found a predominance of men, also married.[16,24] A Jordanian study found a 67.9% predominance of males, which is certainly influenced by local social and cultural issues.[25]

As for work modalities and areas, 35 professors (38.46%) in the study by Pedrolo et al.[16] taught a few hours in remote activities. In the present study, the workload reported by professors did not exceed 8 hours per day, as in the study by Mattos et al.,[6] in which 41.2% of the professors had a similar workload. In other studies, professors reportedly exceeded the expected workload during the pandemic.[16,17,25]

Overwork and time mismanagement often result in little or no physical activity on the part of professors. In the study by Cirilo et al.,[17] 25% of female professors were active or very active, while 75% were sedentary or irregularly active. In the study by Sanchez et al.,[24] most professors (59.5%) had leisure activities once or twice a week but were sedentary and/or had little physical activity. In the present study, six professors (30%) were physically active five times a week, and five (25%) were so three times a week (Table 1). Even though the sample in the present study had little physical activity/exercise, they met the WHO recommendations of 150 to 300 minutes of moderate physical activity or 75 to 150 minutes of intense physical activity per week. Being physically active is known to improve people's health,[17,24] their responses during the workday, and organic aspects against diseases and conditions. [24]

The analysis of quality of life per sex showed that men had higher scores in almost all domains, except for physical role functioning. Its analysis per age range showed that professors above 45 years old had lower scores in all physical and mental quality-of-life domains than those under 44 years old. In the study by Felício et al.,[26] which approached 49 workers of a public health laboratory, SF-36 scores were higher than 68.3 in all domains. In the present study, the scores in all domains were higher than 54 per sex and higher than 47.5 per age.

In the same research context, Felício et al.[26] found better vitality scores in older subjects than in younger ones. In the studies by Lizana and Vega-Fernadez[22] and Lizana et al.,[23] professors had low mental quality-of-life scores. Professors 44 years or younger are at greater risk of effects on their mental quality of life, while those 45 years or older are at greater risk of effects on their physical quality of life. They also analyzed these aspects before and after the pandemic and found that professors perceived higher quality of life in all dimensions before the pandemic than during it.

Lower SF-36 scores, which indicate worse performance in this area, may be related, among other aspects, to overwork, as professors in blended teaching had to prepare both in-person and online classes and activities, which overloaded them. The literature has already reported such occurrences, in which professors had difficulties balancing their work and family, working longer hours during the pandemic, and consequently feeling a greater impact on their mental health.[22,27] Moreover, having to work from home was tougher on professors who did not have an adequate room to teach their classes, leading to symptoms of musculoskeletal pain, stress, and poor mental health, thus impairing quality-of-life domains.[17] Older professors certainly have greater experience, knowing their physical limits, and therefore better protecting and respecting their bodies regarding structural compensations in their daily lives.

Impacts on body posture that cause musculoskeletal pain (Table 3) are common among professors and affect many of them. The high prevalence of pain can be explained by the professors' posture during their work activities, raising their shoulders and inclining their heads forward in orthostatic position or sitting for long periods in inadequate environments. Muscle pain may also be triggered or aggravated by anxiety[24] (as it increases muscle tension) and the current organization of work among professors, exposing them daily to conflicts and tensions.

Postural assessment in the present study showed that most professors had deviations in the expected angles, in different regions of their columns, and at various levels. Work usually affects the musculoskeletal system when its physical demands are not balanced with the professor's physical capacity. The musculoskeletal system anatomy is developed to make movements that enable the professional to do their activities. However, it needs rest to recover and avoid having its functions impaired. Pain may be associated with difficulties doing activities of daily living and performing occupational duties, thus influencing their autonomy, and causing social and economic problems.

These situations combine poor postural habits with an occupation that greatly impacts their physical and

emotional domains, helping develop chronic postural and musculoskeletal disorders among professors. The pain and discomfort caused by musculoskeletal diseases, especially neck pain and backache, can impact professors' work, changing their routine, performance, and work setting.[28]

The angle values addressed in this study have no cutoff/reference standards. Nevertheless, it can be stated that the professors' mean angles were abnormal, especially in the shoulder girdle and pelvic girdle, indicating that female professors had quantitative body posture changes.

Neck pain and backache may be associated with movements with raised upper limbs and overwork.[29] Maintaining orthostatic posture or sitting at work tends to increase neck muscle pain. Professors in general spend most of their day sitting in the classroom, which poses a risk factor for such conditions. Furthermore, the emotional tension faced by professors can reflect on their mental health.[30,31]

The stress perceived by 45.1% of participants during the period of remote activities was above average and was directly related to muscle pain and postural changes in the neck, shoulders, and back.[6] Rocha et al.[32] state that inclining the head forward may be accompanied by other factors such as an inadequate posture when sitting in front of the computer. The study by Almhdawi et al.,[25] identified an association between increased neck pain when teaching online from home and excessive computer use. The authors also verified that the change from in-person to online classes led 36.5% of participants to report inadequate settings and poor ergonomics during the pandemic. This agrees with studies indicating that poor ergonomics may be associated with neck muscle pain and decreased quality of life.[22,23,26] The literature further points out that depression, anxiety, and stress can also lead professors to adopt a closed posture.

In the present study, cervical spine issues were strongly correlated with mental and physical domains in males, whereas females had a greater overall postural impairment, encompassing the shoulder girdle and pelvic girdle. This finding may be explained by cultural and social issues that have always overloaded women, which enables them to have greater mental resistance. Also, body posture was significantly correlated with quality of life among younger individuals in the present study sample, which was not found among older ones. As previously mentioned, this may be associated with their greater experience and self-awareness.

Data in this study reveals significant findings on postural and quality-of-life issues and increased screen time during the pandemic. Unlike initially hypothesized, men and younger individuals had significant changes in their mental quality of life.

Some limitations must be considered regarding the interpretation of study results on quality of life and posture. Few people in the study population adhered to the research, leading to a small sample. Since collection took place during the pandemic, though applying biosafety measures, many volunteers were uninterested in participating and feared in-person dynamics. Moreover, most data were collected from professors of public institutions, with few ones from private institutions.

Conclusion

This study showed that professors' quality of life and body posture were impaired during the COVID-19 pandemic. Women and individuals above 45 years old suffered a greater impact on their quality of life. Among men, changes in the neck had a greater and stronger relationship with physical and mental quality-of-life domains.

Among women, postural changes in the neck, chest, and back were related to physical quality-of-life domains. Hence, changes in higher education during the pandemic noticeably impacted all contexts of the professors' health.

Authors´contributions

ALCC and GJV, supervised by ARBS, participated in all stages, constructing the project, searching the bibliography, collecting and analyzing data, discussing results, and writing and critically revising the manuscript. Each author contributed individually and significantly to the research. Hence, all of them were responsible for all aspects of the study and approved the final version of the article.

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