Original article

Analyzing complaints of arm, neck, and shoulder pain among academicians in Malaysia: a cross-sectional study on prevalence and contributing factors

Analisando queixas de dores nos braços, pescoço e ombros entre acadêmicos na Malásia: um estudo transversal sobre prevalência e fatores contribuintes

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ABSTRACT | OBJECTIVES: Complaints of arm, neck, and shoulder (CANS) have been recognized as an important cause of work disability. Therefore, it is essential to identify those health risk factors for the development of CANS before they escalate into a disabling musculoskeletal condition. This study aims to ascertain the association between individual, physical, and psychosocial risk factors and the occurrence of CANS among academics in Malaysia. **METHODS:** A cross-sectional study design was adopted, enrolling 296 academic staff working at a private university in Malaysia using a convenient sampling approach. A content-validated questionnaire was distributed among selected academic staff to gather their feedback on the prevalence and contributing factors of CANS, and the survey was conducted for a period of six months. The chi-square test was used to analyze the association between risk factors and CANS, and multiple logistic regression was used to predict the risk factors of CANS. This study links all the health risk factors to CANS in Malaysian academicians. **RESULTS:** Of the academic staff who participated in this study, 63.5% reported an annual prevalence of CANS. Physical risk factors, including work experience, adopting a static head-down posture, time spent per day in teaching, and the number of hours spent in front of a computer, are associated with CANS ($p<0.05$). However, the utility of back support ($p=0.878$) and footrests ($p=0.078$) does not show any association with the occurrence of CANS ($p>0.05$). Besides job demand, other psychosocial factors do not show any significant association with CANS. **DISCUSSION:** The study found that 63.5% of academic staff suffer from arm, shoulder and neck pain, which is linked to physical risk factors such as work experience, static posture, teaching time and computer use. Back support and footrests had no significant influence on the complaints. Addressing physical risk factors is key to reducing these conditions among academic staff.

KEYWORDS: Musculoskeletal Disease. Risk Factors. Faculty. Teachers.

RESUMO | OBJETIVOS: As queixas do braço, pescoço e ombro (CANS, na sigla em inglês) foram reconhecidas como uma importante causa de incapacidade no trabalho. Portanto, é essencial identificar aqueles fatores de risco para a saúde para o desenvolvimento de CANS antes que elas se tornem uma condição musculoesquelética desabilitante. Este estudo visa determinar a associação entre fatores de risco individuais, físicos e psicossociais e a ocorrência de CANS entre acadêmicos na Malásia. **METODOS:** Um projeto de estudo transversal foi adotado, matriculando 296 funcionários acadêmicos que trabalham em uma universidade privada na Malásia usando uma abordagem de amostragem conveniente. Um questionário validado pelo conteúdo foi distribuído entre os funcionários acadêmicos selecionados para reunir os seus comentários sobre a prevalência e os fatores que contribuíram para a doença, e o inquérito foi conduzido por um período de seis meses. O teste Chi-square foi usado para analisar a associação entre os fatores de risco e as CANS, e regressão logística múltipla foi utilizada para predizer os fatores de risco de CANS. Este estudo vincula todos os fatores de risco para a saúde às CANS em acadêmicos da Malásia. **RESULTADOS:** Dos acadêmicos que participaram deste estudo, 63.5% relataram uma prevalência anual de CANS. Os fatores de risco físicos, incluindo a experiência de trabalho, a adoção de uma postura estática de cabeça para baixo, o tempo gasto por dia no ensino e o número de horas passadas na frente de um computador, estão associados com CANS ($p<0.05$). No entanto, a utilidade do suporte traseiro ($p=0.878$) e dos suportes de rodapé ($p =0.078$) não mostra nenhuma associação com a ocorrência de CANS ($p>0.05$). Além da procura de emprego, outros fatores psicossociais não mostram qualquer associação significativa com a CANS. **CONCLUSÃO:** O estudo constatou que 63,5% dos docentes sofrem de dores nos braços, ombros e pescoço, o que está ligado a fatores de risco físicos, como experiência de trabalho, postura estática, tempo de ensino e uso do computador. O apoio para as costas e os apoios para os pés não tiveram influência significativa nas queixas. Abordar os fatores de risco físicos é fundamental para reduzir estas condições entre o pessoal acadêmico.

PALAVRAS-CHAVE: Doenças Musculoesqueléticas. Fatores de Risco. Docentes. Professores.

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1. Introduction

Musculoskeletal disorders (MSDs) encompass a range of disorders that cause discomfort and pain and affect multiple parts of the body.[1,2] These disorders are not limited to the muscles, but can also affect tendons, nerves and other soft tissues.[2,3] Individuals suffering from musculoskeletal disorders experience symptoms that can be severe and debilitating.[3] People suffering from work-related musculoskeletal disorder (WRMSD) experience pain and discomfort due to their work environment or, more specifically, their work performance. Workers in certain sectors such as manufacturing[4], services[5], construction[6], and paramedic[7] are more likely to suffer from WRMSD, resulting in pain and disability. Previous studies have shown that back discomfort due to work-related activities is the most common problem of all body parts, accounting for 95.1% of cases.[8] This is followed by back pain at 82.4%, shoulder problems at 84.1%, wrist pain at 81.0%, upper back problems at 78.1% and elbow problems at 77.1%.[8] This has led to the use of a convenient term, CANS – an acronym for Complaints of Neck, Arm, and Shoulder, established by a Delphi consensus. CANS is mainly characterized as musculoskeletal symptoms originating in the neck, arm and shoulder region without being directly caused by acute trauma or systemic disease factors.[9]

It has been reported that CANS patients may experience a range of symptoms. These may include painful sensations, clumsiness, stiffness, numbness, poor coordination, and weak muscles.[10] Other indications may include skin discoloration and temperature changes on the neck, shoulder, arm, elbow, wrist, hand or fingers.[9] There are several factors that may contribute to the onset of CANS, including sociodemographic, physical, psychosocial, and organizational factors.[11] Musculoskeletal symptoms due to CANS pose a significant challenge, particularly for individuals who perform strenuous physical activities. These jobs require various physical activities such as lifting, pulling, pushing, standing, walking, bending, and performing forceful or rapid, repetitive tasks. Consequently, the pain associated with musculoskeletal disorders can hinder the performance of routine work tasks. It is important to note that the physical demands of the job contribute significantly to the development and persistence of musculoskeletal disorders. While some people manage to continue working despite a musculoskeletal disorder, others may experience an imbalance between the physical demands of their job and their personal abilities, leading to the risk of reduced work ability, increased sick leave, and premature departure from the workforce.[12] Additionally, the presence of CANS is known to increase costs associated with workers' compensation. This accumulation of problems culminates in a significant health and economic burden on employees, employers and society, both in health and economic terms. Morbidity attributable to work-related risks can be incredibly damaging, a reality confirmed by numerous studies and researchers.[13] CANS is not caused by a single root but can be due to multiple risk factors, potentially leading to the development of disease and injury. Therefore, it is important to understand the risk factors to ensure a person's well-being.

With the establishment of numerous new universities and colleges in Malaysia, the academic workforce has grown rapidly.[14] Not only has the number of academic professionals increased, but the number of work-related musculoskeletal disorders (WRMSD) they suffer from has also increased in recent years. This assumption is supported by recent studies showing that WRMSD among academic staff increased exponentially from 33% to 43% from 1990 to 2019.[14,15] A previous study on WRMSD among academics in Saudi Arabia found that 42.5% of academics suffer from musculoskeletal disorders annually, with the lower back (31.9%) being the most common body region, followed by the neck (26.1%) and the knees (21.3%), shoulder (16.9%), upper back (13%).[1] Comparable studies on the frequency of musculoskeletal disorders have been carried out among school teachers in various countries. These studies show that a significant percentage (57.3%) of teachers in Ethiopia suffer from musculoskeletal pain, particularly in the shoulder and neck areas.[16] In Kenya, a significant proportion (58.6%) report back pain as their main problem, followed by knee pain (57.6%) and neck pain (53.3%).[17] In contrast, Egypt's findings show that an overwhelming majority (56%) of teachers suffer from neck problems, with

a significant number (53.2%) also suffering from back-related musculoskeletal disorders.[18] It was found that there is a lack of research examining the various risk factors in academia, particularly in the Malaysian region. Therefore, the aim of this study is to fill this research gap by focusing on examining the association between CANS and all associated risk factors. Specifically, it reveals the association between individual physical and psychosocial risk factors and the occurrence of CANS among academics at a private university in Malaysia.

2. Material & Methods

2.1. Study Design

A cross-sectional study design was adopted to demonstrate the prevalence and contributing factors of CANS among academics at a private university in Malaysia.

2.2. Study Settings and Participants

This study focused on all academics (N=766) working both full-time and part-time in a private university in Malaysia. Among them, those who met a set of inclusion criteria were screened and included in the sampling frame. These include: Participants aged between 20 and 50, full-time academics, with more than one year of professional experience. Participants with rheumatic diseases, malignant diseases or disorders of the central or peripheral nervous system were excluded from this study. Accordingly, 349 faculty members of a private university in Malaysia constituted the sampling frame and were invited to participate using a convenience sampling approach. The questionnaire was distributed to the faculty members of a private university via a Google Form via official email in the last quarter of 2022. The questionnaire was structured to provide details on the objectives of the study, data confidentiality and informed consent. Each participant had to fill it out before starting to fill out the questionnaire. Specific instructions in the email on how to complete the questionnaire and contact details in case participants have any questions or encounter difficulties completing the questionnaire. If participants have not completed the Concern Form, they will automatically be redirected to exit the form. Participants were given four weeks to complete the form and return it via Google. Efforts were made to reduce bias by informing participants that this was a self-reported survey and confirmation of the diagnosis of the presence of CANS requires a formal examination by a physician. A total of 296 questionnaires were received, 53 respondents were excluded because they did not meet the sampling criteria and had not completed the questionnaire, which corresponds to a response rate of 85%.

2.3. Instrumentation

A content-validated questionnaire was developed to examine the prevalence and contributing factors of CANS among academics. The questionnaire was validated by three experts and structured to understand the physical and psychological risk factor associated with complaints of arm, neck, and shoulder pain (CANS). The first section of the questionnaire collects three specific pieces of information about the participants, such as personal data, socio-demographic and professional experiences. The second part of the questionnaire consists of three items, the first of which determines the extent of pain in the arm, neck and shoulder. The third and fourth points focus on identifying physical risk factors and understanding psychosocial risk factors, respectively.

2.4. Ethical considerations

Prior to data collection, all participants were informed of the details of the study and a written informed consent was obtained. This study was approved by Research and Ethics Committee of INTI International University (INTI-IU/FHLSRC/BPHTI/7NY12020/016).

2.5. Analytical Methods

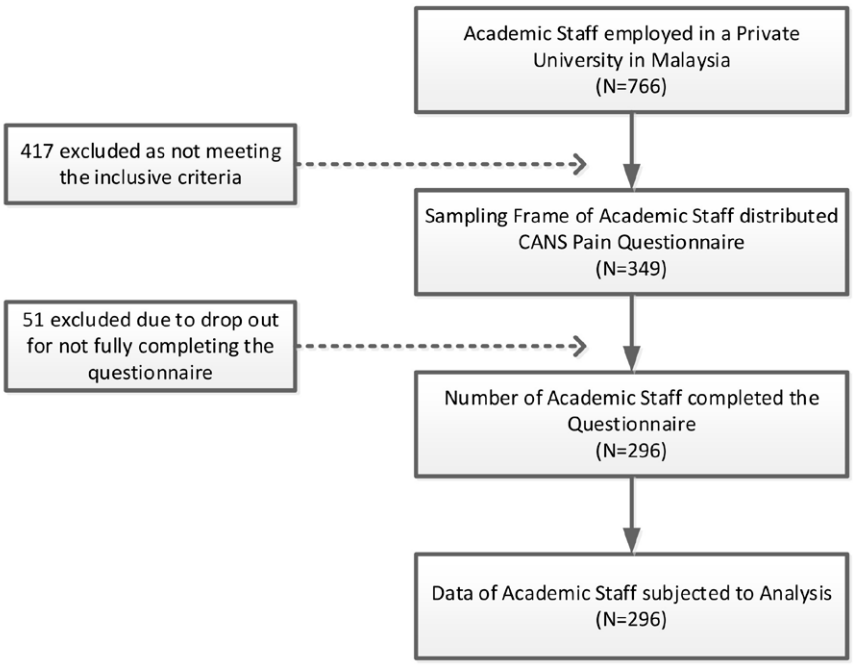
Data were analyzed using the SPSS statistical software package (version 26.0). Normality was tested using the Kolmogorov-Smirnov test, Q-Q plot, and skewness ranging from -1 to 1. Cross-tabulations were used to analyze descriptive characteristics, chi-square was used to analyze the association between risk factors and CANS. Multiple logistic regression was used to examine the relationship between CANS and physical as well as psychosocial risk factors. Findings were defined at a 95% confidence level with a significant level at $p<0.05$.

3. Results

3.1. Sociodemographic characteristics of participants with and without CANS

The sample recruitment process and the number of samples included in this study are shown in Figure 1. The socio-demographic characteristics of the participants (individual risk factors) were summarized in Table 1. The majority of participants were female with an average age of 38.25 ± 5.15. It was also found that more than 40% of the participants were above normal BMI. About 55% of the participants lead a sedentary lifestyle and 82% of them do not smoke. Of those reported CANS, 64% were female. In terms of BMI, 48% of those reported CANS are overweight and 12% of them are obese. Additionally, 52% of respondents leading a sedentary lifestyle reported CANS in the last 12 months. Among those responded, 63.5% of the participants (n=188) reported CANS in the last 12 months. Considering the individual risk factors, age is significantly associated with the annual prevalence of CANS among academics ($p < 0.05$). Other factors such as gender ($p = 0.226$), BMI ($p = 0.543$), smoking habits ($p = 0.359$), alcohol consumption habits ($p=0.818$), and sedentary life style (physical inactivity) ($p = 0.525$) are not associated with the occurrence of CANS (Table 1).

Figure 1. Sample Recruitment Flow Chart



Source: the authors (2023).

Table 1. Demographics of the participants with and without CANS

Variables	Without CANS n (%)	CANS n (%)	Total n (%)	p-value
Gender				
Male	50 (46.3)	68 (36.2)	118 (39.9)	0.226
Female	58 (53.7)	120 (63.8)	178 (60.1)	
Age (mean± SD)	38.25±5.152			
20-30	2(3.7)	0(0)	2(1.4)	**0.011***
31-40	53(70.4)	100(53.2)	153(59.5)	
41-50	53(70.4)	88(46.8)	141(39.2)	
BMI (Kg/m^2)				
Underweight (<18.5)	6(5.6)	4(2.1)	10(3.4)	0.543
Normal (18.5-24.9)	48 (44.4)	72(38.3)	120(40.5)	
Overweight (25-29.9)	42 (38.9)	90(47.9)	132(44.6)	
Obesity (≥30)	12 (11.1)	22 (11.7)	34(11.5)	
Sedentary lifestyle				
Yes	66(61.1)	98(52.1)	164 (55.4)	0.525
No	42 (38.9)	90(47.9)	132 (44.7)	
Smoking Habits				
Current Smoker	6 (5.6)	6(3.2)	12(4.1)	0.359
Non-Smoker	92 (85.2)	150 (79.8)	242 (81.8)	
Previous Smoker	10 (9.3)	32 (17.0)	42 (14.2)	
Alcohol consumption				
Yes	66 (61.1)	98 (52.1)	164 (55.4)	0.818
No	42 (38.9)	90 (47.9)	132 (44.7)	

*p<0.05, BMI-Body mass index, SD-Standard Deviation.
Source: the authors (2023).

3.2. Physical risk factor among participants with and without CANS

The physical risk factors observed among the participants with and without CANS are presented in Table 2. Most participants were lecturers (77%) with a mean teaching experience (years) of 10.78 ± 5.30. The average number of teaching hours per week was 20.1 ± 9.07 hours. There is an association between the time spent on teaching and the annual prevalence of CANS. Specifically, 60% of those who taught more than 20 hours per week reported CANS in the past 12 months. The study reveals that sitting most of the time and spending time in front of a computer is associated with CANS, with 71% and 20% reporting it. Over 51% of participants use a backrest while seated, while the majority do not use a footrest or wrist support while working. Both the utility of back support (p=0.878) and footrests (p=0.078) do not show any association with the occurrence of CANS. Another important factor associated with CANS is the adoption of static head-down posture, where over 62% of those reported CANS had this typical working posture (p<0.05). Notably, the type of teaching medium adopted by the academics does not have any association with the occurrence of CANS (p=0.460).

Table 2. Chi-square test showing the association between CANS and physical risk factors among Academicians in Malaysia

Variables	Without CANS n (%)	CANS n (%)	Total n (%)	p-value
Academic position				
Lecturer	60 (64.8)	168 (84.0)	228 (77.0)	
Senior lecturer	8 (7.4)	0 (2.5)	8 (2.7)	
Professor	8 (7.4)	20 (10.6))	28 (9.5)	**0.001****
Others	22 (20.4)	10 (5.3)	32 (10.8)	
Teaching experience (year) (Mean ±SD=10.78±5.304)				
2-9	60 (55.6)	54 (28.7)	114 (38.5)	
10-19	48 (44.4)	128 (68.1)	176 (59.5)	**0.003****
20-29	0 (0)	6 (3.2)	6 (2.0)	
Teaching hours/ week (Mean ±SD=20.15±9.071)				
≤20	62 (57.4)	76 (40.4)	138 (46.6)	**0.046***
>20	46 (42.6)	112 (59.6)	158 (53.4)	
Hours spent in sitting (Mean ±SD=8.20± 4.150)				
<5	28 (25.9)	18 (9.6)	46 (15.5)	
6-10	78 (72.2)	132 (70.2)	210 (70.9)	**0.001****
>10	2 (1.9)	38 (20.2)	40 (13.5)	
Hours spent in standing (Mean ±SD=3.76+2.161)				
<5	96 (88.9)	172 (91.5)	168 (90.5)	
6-10	12 (11.1)	14(7.4)	26 (8.8)	0.570
>10	0(0.0)	2 (1.1)	2 (0.7)	
Hours spent in front of the computer (Mean ±SD=7.93+4.108)				
<5	28 (25.9)	18 (9.6)	46 (15.5)	
6-10	78 (72.2)	132 (70.2)	210 (70.9)	**0.001****
>10	2 (1.9)	38 (20.2)	40 (13.5)	
Medium of teaching (Utility of Teaching Platform)				
Laptop	94 (87.0)	174 (92.6)	168 (90.5)	
Whiteboard	8 (7.4)	10 (5.3)	18 (6.1)	
Others	6 (5.6)	4 (2.1)	10 (3.4)	0.460
Static head down posture (>2hr/ day)				
Yes	48 (28.9)	118 (62.8)	166 (56.1)	
No	60 (55.6)	70 (37.2)	130 (43.9)	**0.031***
Back support				
Yes	78 (51.7)	73 (48.3)	151 (51.1)	
No	30 (20.7)	115 (79.3)	145 (48.9)	0.878
Wrist support				
Yes	24 (22.2)	66 (35.1)	90 (30.4)	
No	84 (77.8)	122 (64.9)	206 (69.6)	**0.044***
Footrest				
Yes	78 (48.4)	83 (51.5)	161 (54.4)	
No	20 (14.8)	115 (38.9)	135 (45.6)	0.078
Habit working in dark environment (Less illuminated area)				
Yes	58 (53.7)	116 (61.7)	174 (58.8)	
No	50 (46.3)	72 (38.3)	122 (41.2)	0.341

*p<0.05, **p<0.01
Source: the authors (2023).

3.3. Psychosocial risk factor among participants with and without CANS

The prevalence of psychosocial characteristics of participants with and without CANS is summarized in Table 3. The results of the study showed that a large proportion of participants reported facing significant pressure in their jobs, with over 64% of them 'often' or 'always' facing high job demands. The study reveals that many participants rated “sometimes” on the level of satisfaction in their jobs. This implies that most individuals did not necessarily express a high level of satisfaction but fell somewhere in the middle spectrum. The results of our study have indicated that job demand in the realm of psychosocial factors is the only one that exhibits a noteworthy statistical significance ($p<0.05$). Conversely, other areas of interest, such as social support ($p=0.874$), job control ($p=0.4880$), and job satisfaction ($p=0.255$), failed to demonstrate any conclusive statistical links with CANS.

Table 3. Chi-square test showing the association between CANS and psychosocial risk factors among Academicians in Malaysia

Variables	Without CANS n (%)	CANS n (%)	Total n (%)	p-value
Job demands				
Always	6(5.6)	34 (18.8)	40 (13.5)	
Often	50(46.3)	102(54.3)	152(51.4)	
Sometimes	50(46.3)	50(26.6)	100(33.8)	**0.037***
Seldom	2(1.9)	2(1.7)	4(1.4)	
Never	0	0	0	
Social support				
Always	8 (2.8)	20 (10.8)	28 (7.5)	
Often	54 (49.1)	76 (40.9)	130 (44.2)	
Sometimes	44 (40)	82 (44)	126 (42.6)	
Seldom	4 (3.6)	8 (4.3)	12 (5.4)	0.874
Never	0	0	0	
Job control				
Always	6 (5.6)	4 (2.1)	10 (3.4)	
Often	36 (33.3)	80 (42.6)	116 (39.2)	
Sometimes	42 (38.9)	72 (38.3)	114 (38.5)	0.488
Seldom	24 (22.2)	32 (17.0)	56 (18.9)	
Never	0	0	0	
Job satisfaction				
Always	6 (5.6)	4 (2.1)	10 (3.4)	
Often	30 (27.8)	80 (42.6)	110 (37.2)	
Sometimes	64 (59.3)	90 (47.9)	154 (52.0)	0.255
Seldom	8 (7.4)	14 (7.4)	22 (7.4)	
Never	0	0	0	

*p<0.05
Source: the authors (2023).

Table 4. Multiple Logistic regression of physical risk factors associated with CANS among Academicians in Malaysia

Variables	B	S.E.	Wald	Sig.	Adjusted OR	95% C. I	
						Lower	Upper
Academic position	0.237	0.156	2.320	**0.028***	1.267	0.934	1.719
Teaching experience	0.761	0.255	8.928	**0.003***	2.141	1.299	3.528
Teaching hours/ week	0.325	0.316	1.056	**0.043***	1.384	0.745	2.570
Hours spent in sitting	0.721	0.477	2.281	0.131	2.056	0.807	5.237
Hours spent standing	-0.086	0.473	0.033	0.856	0.918	0.363	2.321
Hours spent in front of the computer	0.338	0.476	0.504	0.478	1.402	0.552	3.563
Medium of teaching	0.042	0.377	0.012	0.911	1.043	0.498	2.185
Static head-down posture	1.872	0.359	27.245	**0.000***	6.501	3.219	13.130
Back support	-.219	0.297	0.543	0.461	0.803	0.448	1.439
Wrist support	-2.147	0.416	26.628	**0.000***	0.117	0.052	0.264
Habit working in dark environment	0.540	0.348	2.412	0.120	1.717	0.868	3.396
Footrest	0.094	0.341	0.076	0.782	1.099	0.563	2.146
Constant	-3.254	1.159	7.883	0.005	0.039		

*OR=Odds Ratio; CI=Confidence Interval; * Significant at 0.05 levels.
Source: the authors (2023).

Table 4 shows a multiple logistic regression of the physical risk factors for the development of CANS. Based on the adjusted Odds ratio and standardized coefficient, variables such as academic position (adjusted OR=1.267, CI=0.934-1.719, p=0.043), teaching experience (adjusted OR=2.141, CI=1.299-3.528, p=0.003), teaching hours per week (adjusted OR=1.384, CI= 0.745-2.570, p=0.043), adoption of static head down posture (adjusted OR=6.501, CI=3.219-13.130, p=0.000) and wrist support during (adjusted OR=0.117, CI=0.052-0.264, p=0.000) computing were found to be an independent risk factor and predictor of CANS among academics in Malaysia.

Table 5. Multiple Logistic regression of psychosocial risk factors associated with CANS among Academicians in Malaysia

Variables	B	S.E.	Wald	Sig.	Adjusted OR	95% C. I	
						Lower	Upper
Job demands	1.086	0.208	27.143	**0.001***	2.963	1.969	4.458
Social support	0.261	0.226	1.335	0.248	1.299	0.834	2.023
Job control	-.034	0.226	0.023	0.879	0.966	0.621	1.503
Job satisfaction	-.032	0.280	0.013	0.909	0.969	0.559	1.677
Constant	-3.886	1.087	12.775	0.001	0.021		

*OR=Odds Ratio; CI=Confidence Interval; * Significant at 0.05 levels.
Source: the authors (2023).

Table 5 shows a multiple logistic regression to determine the psychosocial risk factors for the development of CANS. Other than job demand (adjusted OR=2.963, CI=1.969-4.458, p=0.001), other factors do not predict the occurrence of CANS among academicians in Malaysia.

4. Discussion

The results of our study showed that 63.5% of academics developed CANS. The aim of our study was to determine the association between CANS and its associated risk factors, including individual, physical and psychosocial factors, in academics. This study found that the association between CANS and age was highly significant among academics. Interestingly, this result is consistent with the results of many previous studies that have highlighted an association between work-related upper extremity diseases (WRULD) and aging problems in academics, as previously reported in the literature.[16] A previous study conducted in Malaysia established a link between the aging process and the occurrence of CANS, with total shoulder pain scores significantly related to age. The older the age, the higher the pain score.[19] Specifically, aging can cause changes like muscle mass and strength loss, decreased bone density, and altered tendons and ligament structure. These changes can reduce support and stability for the neck, arms, and shoulders, leading to increased strain and discomfort during everyday activities, which may result in CANS-related complaints. Another major contributor to CANS in the aging population is degenerative disease. If the musculoskeletal system is impaired, osteoarthritis and pain in the lower back area between the fifth and ninth decade of life are one of the main causes.[20]

The authors also emphasize how the teaching and learning process produces CANS in teachers. Due to technological advancements and the impact of the COVID-19 pandemic, the current education trend has shifted from traditional classrooms to online learning environments; however, certain traditional teaching tasks such as grading papers, using textbooks and conducting practical sessions still need to be completed. These practices can worsen musculoskeletal pain in academics. Specifically, a previous study among Nigerian teachers found that the shoulders and neck were most affected by pain. The factors attributed to the pain in this region are that teachers often work in overhead positions with their arms outstretched, which is unusual when writing on the board or pointing to pictures on boards/charts during class, and especially when writing frequently adopting a “head-down” posture when grading exam papers and using electronic devices during online classes.[21]

Interestingly, no significant association between CANS and gender was found in this study. However, this finding contradicts similar studies that reported that high pain intensity in the neck/shoulder area and/or back as well as high workload were associated with low work ability in sick women.[22] Unusual postures can lead to muscle fatigue and the gradual recruitment of additional muscle fibers as a compensatory mechanism, which can lead to muscle injury and pain.[19] Furthermore, our results showed no significant association between CANS and BMI. However, it has been suggested that obesity is associated with neck pain and low back pain, particularly the level of low back pain.[19] This contradictory result can be explained by the fact that only 11.7% of participants in our study were obese. Although other literature has found both alcohol consumption[23] and smoking[24,25] to be associated factors for CANS, no association could be found in this study due to the low frequency of participants engaging in these habits. Specifically, 3.2% of participants with CANS in this study were smokers and only 17% of participants consumed alcohol.

Concerning physical risk factors, it was observed that variables such as academic position, teaching experience, teaching hours per week, adoption of static head posture and wrist support during arithmetic were found to be independent risk factors for predicting CANS among academics in Malaysia (Table 4). Specifically, this study shows a significant association between those who reported CANS and those without symptoms. Exactly, 70% of participants in our study who spent more than 6 hours sitting developed CANS. Sitting for less than seven hours per day was associated with a slight increase in the incidence of shoulder and neck pain, and these results are consistent with previous studies.[22] In contrast, a lower incidence of neck and back pain is associated with short sitting duration.[26] Sustained sitting for frequent reading, marking assignments and in front of the computer, standing up in class to teach, and repeatedly writing overhead on the board are all hazardous activities that contribute to the development of neck, shoulder, and upper limb pain in teachers.[26] Nevertheless, previous study results showed no significant association between CANS and working time, with the exception of neck flexion posture.[27] These results may not be consistent with the present study because the previous study was conducted on computer professionals who spent extended periods of time at a computer with their neck flexed.[28] Working with a protruded chin posture during computer processing placed a lot of strain on the posterior neck muscles, resulting in muscle fatigue. This would place even greater stress on the non-contractile and posterior neck tissues, resulting in neck pain.

The results of the current study support ideas from previous literature that psychosocial factors are important predictors of musculoskeletal disorders (MSDs) in teachers.[29,30] Despite low levels of physical exertion, musculoskeletal disorders have been associated with low social support and low job satisfaction.[30] Interestingly, our study also finds that work demand was the only factor associated with CANS (Table 5). On the other hand, excessive psychological expectations of work, poor job management, monotonous work and a lack of social support for employees in the workplace are among the risk factors for musculoskeletal disorders related to psychosocial stress.[31] Psychosocial factors are associated with various MSDs comprising injury to peripheral nerves, musculoskeletal tissues, and/or tendons.[32] Although the current study found an association between CANS and job demand, previous research suggests that there is only a minimal association between neck and shoulder pain and low job satisfaction.[22]

4.1 Limitations

As this is a cross-sectional study based on the perceptions of academics employed at a specific private university in Malaysia, these findings cannot be generalized to the whole of Malaysia. Future work should therefore include a more comprehensive survey of academics working in all universities in Malaysia and elsewhere in the world. In addition, the prevalence and contributing factors of CANS among academics were assessed using a questionnaire and self-reported by participants, which could lead to response bias in which participants intentionally or unintentionally provide inaccurate or misleading information in their responses and a more formal objective examination is needed to confirm the diagnosis of CANS. Furthermore, these response biases could be overcome by properly designing the questions in the questionnaire clear, concise and free

of leading or biased language and by pilot testing the questionnaire with a small group of academics to identify and address possible problems with the wording, question clarity or answer options. In addition to cross-sectional studies, more empirical studies are needed to investigate the influence of risk factors on the occurrence of CANS. This study did not consider psychological variables, postural assessments, and home and work evaluations. Because it is a cross-sectional study, this study did not assess individual levels of physical activity, which could lead to differences in the association between CANS and other variables. Future research, preferably a longitudinal study, is needed to thoroughly investigate CANS and its associated risk factors.

5. Conclusion

This study concluded that 63.5% of participating academics reported annual prevalence of CANS in Malaysia. Furthermore, it reveals the association between individual, physical and psychosocial risk factors, and the occurrence of CANS in academics. Other than age, no other individual risk factors have been demonstrated to be significantly associated with CANS. However, physical risk factors consisting of academic position, total teaching experience, weekly class hours, time spent in front of the computer, adopting a static head posture, and wrist support while using the computer show a significant association with CANS. Of the psychosocial risk factors, only work demand shows a significant association with the occurrence of CANS among academic staff. This study highlights the educational policy planners who provide academic staff with adequate ergonomic knowledge and hassle-free work environment to overcome CANS and thus increase their job satisfaction and productivity.

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Authors' contributions

Muniandy Y and Lim YD worked on the conceptualization of the study, while Subbarayalu AV participated in the methodology. Purushothaman VK, Muniandy Y and Lim YD contributed to the writing of the original draft. Subbarayalu AV, Purushothaman VK and Muniandy Y worked on the writing, review, and editing. Muniandy Y contributed in the funding acquisition.

Conflicts of interest

No financial, legal, or political conflicts involving third parties (government, private companies, and foundations, etc.) were declared for any aspect of the submitted work (including but not limited to grants and funding, advisory board participation, study design, manuscript preparation, statistical analysis, etc.).

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