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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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WORK-RELATED MUSCULOSKELETAL SYMPTOMS AMONG SONOGRAPHY PRACTITIONERS IN THE UAE: A CROSS-SECTIONAL STUDY

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Abstract.

Introduction: Sonographers face exposure to repetitive physical stressors which may lead to the development of musculoskeletal symptoms (MSS) which in turn affect performance and occupational health.

Objective: To evaluate the prevalence of MSS and assess their associations with ergonomic practices, demographic characteristics, and work-related factors among sonographers.

Methods: A cross-sectional survey was conducted among 71 sonography practitioners working in governmental and private healthcare settings. Data were collected on demographic variables, ergonomic practices, work conditions, and MSS across different body regions. Chi-square tests were used to assess associations between variables. P-values < .05 was considered significant.

Results: Of the total 71 sonography practitioners, wrist/forearm pain ranked as the most frequently reported MSS (86 %), followed by neck pain (75%), and shoulder pain (73 %). Sitting during ultrasound examinations (p = 0.016) and maintaining a neutral spine (p = 0.004) both significantly correlated with lower neck pain. Furthermore, ergonomic chairs were related to less wrist/forearm pain (p = 0.015). Significant association of MSS were noted as: gender (female) for shoulder pain (p = 0.047), employment setting for back pain (p = 0.004), bachelor's qualification for wrist/forearm pain (p = 0.004), and professional rank for neck pain (p = 0.036) and wrist/forearm pain (p = 0.001). Age and years of experience did not significantly relate to MSS (p-value > 0.05)

Conclusion: The wrist and forearm pain was the most encountered MSS among sonographers. Ergonomic practices, gender, employment, professional ranks, and workload impact the prevalence of MSS. These findings highlight the necessity of ergonomic adjustments and MSS-specific risk training.

Key words. Sonographers, pain, musculoskeletal symptoms, ergonomics, neck, wrist, shoulder.

Introduction.

Work-related musculoskeletal disorders (WRMSDs) are a serious occupational risk for sonographers and ultrasound practitioners in all workplaces. As noted in one study, the prevalence is above 90% [1]. Injuries are primarily due to the repetitive nature of ultrasound examinations, extended static postures, transducer pressure, and poor workstation ergonomics. Injuries are most common in the neck, shoulders, wrists, and lower back. Ultrasound imaging is a vital diagnostic imaging tool because it is non-invasive, provides real-time imaging, and does not use ionizing radiation [2]. The technique involves a range of complex skills, including hand-eye coordination, anatomical knowledge, and the ability to manipulate the ultrasound probe. Many students and trainees struggle to overcome the steep learning curve of ultrasonography due to difficulties in capturing and interpreting high-quality images and the ergonomic demands of prolonged scanning [3]. Sonographers have a high prevalence of WRMSDs, with studies indicating that over 90% report symptoms. When scanning larger patients using transducers, examiners frequently experience discomfort in the neck, shoulders, and wrists due to the discomfort caused by the transducer and the position/collaborator being scanned, as well as the positional and physical discomfort due to the position of the examiner's arm at shoulder abduction of greater than 30 degrees.

Ergonomic issues may hinder the acquisition of new abilities, as discomfiture and fatigue reduce the effectiveness and concentration of scanning [4-6]. Ultrasound practitioners are more aware of MSS; however, the literature primarily focuses on sonographers rather than on radiologists who perform ultrasound examinations. This imbalance creates a huge gap in the studies of the health issues that are more prevalent between these two professional groups. It is essential to investigate the prevalence of MSS among radiologists and sonographers, given their differing workloads, ergonomic training, and scanning practices. Few studies have examined variations among ultrasound practitioners, both sonographers and radiologists, in the prevalence of MSS. Hence, this study aims to assess the prevalence of MSS among sonographers and to compare the associated risk factors between sonographers and radiologists.

Materials and Methods.

This study is a cross-sectional, self-administered online survey disseminated via social media and the radiology departments of hospitals in the United Arab Emirates (UAE). A cover letter was included that outlined the study's objectives, assured participants of confidentiality, and emphasized the voluntary nature of their participation. The expected duration to complete the survey was 5 minutes. The study was conducted among ultrasound practitioners, both sonographers and radiologists, in both English and Arabic via an online questionnaire developed using Google Forms, which facilitates the distinct measurement of dependent and independent variables, enables access to

a broader participant pool, and is economically efficient. Electronic surveys were distributed to collect basic data on MSS among ultrasound practitioners, both sonographers and radiologists, with at least 1 year of scanning experience. The distribution of surveys in English and Arabic enabled respondents to specify their preferred language. The exclusion criteria are disorders that could distort the study outcomes, including current pregnancy, chemotherapy, or radiotherapy in the past five years, fibromyalgia, uncontrolled diabetes, or renal problems. Musculoskeletal injuries unrelated to work were excluded from the analysis. The participants were selected using non-probability convenience sampling. The sample size was determined using a small-population sample size calculator, yielding a total of 95 participants. A total of 71 participants completed the online questionnaire and were incorporated into the data analysis.

Tools of data collection:

A self-administered questionnaire was used to assess WRMSS experienced by ultrasonography practitioners during their occupational performance. The survey was conducted using an electronic questionnaire distributed online via Google Forms. Participants received an invitation link to complete the survey. An invitation letter for participants, detailing the objective and deadline of the questionnaire survey, was released on Google Forms in January 2025. We developed the questionnaire for ultrasound practitioners in the UAE based on pertinent literature [7-9]. The questionnaire has three components, detailed as follows: (A) Demographic characteristics encompassed age, gender, primary workplace, educational attainment, professional background, principal field of practice, average working hours, the number of patients scanned daily, and years of scanning experience. (B) Knowledge and Practice Information, which utilized the standardized Nordic questionnaire to ascertain knowledge and practical information. The survey's validity and reliability have been tested, estimating Cronbach's alpha coefficient of 0.74, indicating a satisfactory level of internal consistency for the survey items. The response rate was 74.7%, indicating sufficient participation. The dependent variables fixed included elbow positioning at 90 degrees during ultrasound practices, regularity of rest breaks (5-minute minimum breaks every hour of work), transducer grip, and posture (sitting and neutral) while performing ultrasound procedures, especially in section 3. (C) Ergonomics and Health Issues: This covers the ultrasound machines' ergonomic support features and how these machines offer supportive features. It also pertains to MSS, especially pain, with a focus on anatomic sites.

The anatomical regions encompassed the neck, shoulder, wrist/forearm, back, and additional body organs.

Statistical analysis:

The data were analyzed using the SPSS software package (version 29.0; SPSS Inc., USA). Descriptive statistics were exhibited as means ± SD for continuous variables and frequencies (%) for categorical variables. A Chi-square test was employed to compare the prevalence of MSS across the affected body areas. When expected cell counts were fewer than 5, Fisher's exact test was used to assess statistical validity. A p-value of less than 0.05 was considered statistically significant.

Ethical approval:

The study was approved by the Gulf Medical University Institutional Review Board (IRB-COHS-STD-121Mar-2025). The study was conducted in accordance with the principles outlined in the Declaration of Helsinki. All participants were informed prior to the formal survey, and their consent was secured. All participants were directed to complete the questionnaire in full. The objectives and background of the research were elucidated to the participants. The participants were advised that they could withdraw from the study at any time without justification and that all information would remain confidential.

Results.

The fixed study included 71 sonography professionals, of whom 70.4% were female, and 29.6% were male. Participants were employed in various healthcare settings, with the highest representation from private hospitals (46.5%), followed by private clinics (28.2%) and governmental hospitals (25.4%). Most participants held a bachelor's degree (40.8%), while others had a master's (31%), a Ph.D. (16.9%), or a higher diploma (11.3%). The professional composition consisted of 24 radiologists and 45 sonographers. The primary imaging specialties were abdominal imaging (52.1%), followed by transvaginal obstetrics-gynaecology (18.3%) and transabdominal obstetrics-gynaecology (15.5%). The mean age of the participants was 39.32 years (±8.8), with an average of 10.59 years (±6.7) of professional experience (Table 1).

It was observed that neck pain was reported by 75% of participants, with no significant difference between males and females ($p = 0.429$). Shoulder pain was significantly more prevalent in females (76.9%) than males (23.1%), indicating a gender-significant association ($p = 0.047$). Females (73.8%) also more commonly reported wrist/forearm pain than males (26.2%), though the association did not reach statistical significance ($p = 0.127$). Correspondingly, back pain showed a higher prevalence in females (80.0%) than males (20.0%), but this difference was not statistically significant ($p = 0.13$). These findings highlight shoulder pain as the only MSS with a statistically significant gender disparity, suggesting potential ergonomic or workload differences affecting female practitioners more prominently, Table 2 and Figure 1.

The analysis revealed significant associations between specific ergonomic practices and the presence of MSS across different body regions among sonographers. Sitting during ultrasound examinations is significantly linked with neck ($p = 0.016$), wrist/forearm ($p = 0.004$), and back ($p = 0.002$) pain, indicating that prolonged seated positioning may contribute to MSS. Maintaining a neutral spine position was significantly associated with decreased neck pain ($p = 0.004$) and back pain ($p = 0.007$), underscoring the importance of proper posture during scanning. The availability of ergonomic features on ultrasound machines (e.g., Adjustable monitors or machine height) was significantly associated with reduced back pain ($p = 0.001$). What is more, the use of ergonomic scanning chairs was significantly associated with reduced wrist/forearm pain ($p = 0.015$) and showed borderline significance with back pain

Table 1. *Demographic Characteristics of Participants (n=71).*

Variable	Number	%
Gender		
Male	21	29.6%
Female	50	70.4%
Age group		
24-33 years	18	25.4%
34 - 42 years	32	45.1%
43-51 years	12	16.9%
52- 61 years	9	12.7%
Primary Workplace		
Private Clinic	20	28.2%
Private Hospital	33	46.5%
Governmental Hospital	18	25.4%
Highest Professional Level		
BSc	29	40.8%
MSc	22	31.0%
PhD	12	16.9%
Diploma	8	11.3%
Professional Background		
Sonographer	45	63.4%
Radiologist	24	33.8%
OBS	1	1.4%
Orthopedics	1	1.4%
Primary Field of Practice		
Abd Imaging	37	52.1%
Cardiac	2	2.8%
OBS&GYNAE TV	13	18.3%
OBS&GYNAE TA	11	15.5%
Vascular	6	8.5%
MSK	1	1.4%
Superficial	1	1.4%

Table 2. *Prevalence of MSS among the participants.*

MSS	Response	Male (n=21)	Female (n=50)
Neck pain	Yes	17 (81.0%)	36 (72.0%)
	No	4 (19.0%)	14 (28.0%)
Shoulder pain	Yes	12 (57.1%)	40 (80.0%)
	No	9 (42.9%)	10 (20.0%)
Wrist/forearm pain	Yes	16 (76.2%)	45 (90.0%)
	No	5 (23.8%)	5 (10.0%)
Back pain	Yes	6 (28.6%)	24 (48.0%)
	No	15 (71.4%)	26 (52.0%)

Table 3. *Association of factors affecting MSS with different body regions among sonographers.*

Factors affecting the MSS pain	Neck pain	Shoulder pain	Wrist/forearm pain	Back pain
	P-value	P-value	P-value	P-value
How often do you position your elbow at approximately a 90-degree angle during ultrasound practice?	0.761	0.505	0.616	0.754
Do you sit while performing ultrasound examinations?	0.016	0.222	0.004	0.002
Do you take breaks lasting at least 5 minutes during your ultrasound sessions?	0.565	0.803	0.411	0.657
Do you maintain a neutral spine position while performing ultrasound procedures?	0.004	0.286	0.071	0.007
Does your ultrasound machine include ergonomic support features such as an adjustable monitor or adjustable machine height?	0.083	0.207	0.196	0.001
Does your workplace provide supportive equipment, such as an ergonomic scanning chair with a backrest and adjustable height?	0.075	0.17	0.015	0.05

*p value < 0.05 indicate significance.

Table 4. *Factors associated with musculoskeletal symptoms.*

Variables	Neck pain	Shoulder pain	Wrist/ forearm pain	Back pain
	P value	P value	P value	P value
Gender (female)	0.429	.047*	0.127	0.13
Age groups	0.723	0.609	0.144	0.322
Experience years	0.273	0.926	0.909	0.293
Employment (private clinic)	0.924	0.312	0.816	.004*
Academic qualification	0.54	0.316	.004 *	0.31
Professional rank	.036 *	0.195	.001*	0.642

*Bachelor's degree (Academic qualification), Sonographer (Professional rank). *p value < 0.05 indicate significance (Chi-square or Fisher's exact test).*

Table 5. *Significance of working hours per day and the number of patients examined on the work environment of the participants.*

Variables	Males	Females	P value
	n/Mean ± SD	n/Mean SD	
Working Hours per Day	7.86 ±.964	8.52 ± 1.18	0.026
Number of Patients Scanned Daily	21	18	0.218
Years of Experience			
1-5 Years	1	17	
6-10 Years	11	17	0.034
> 10 Years	9	16	

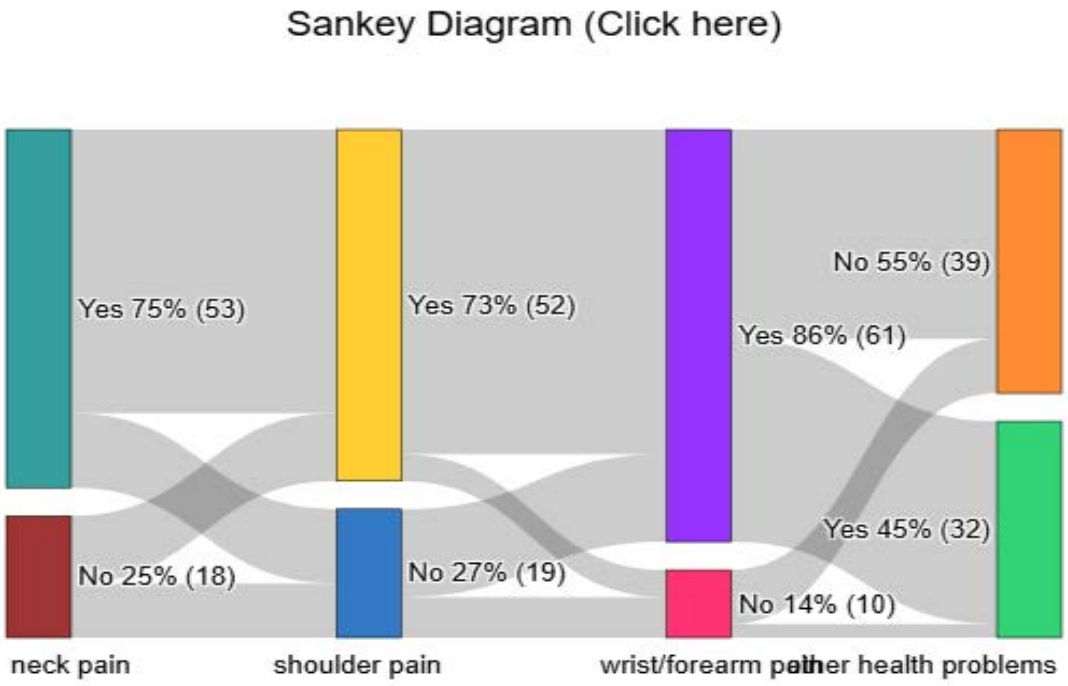

Figure 1. *The prevalence of musculoskeletal symptoms among sonography professionals.*

(p = 0.05). In contrast, factors such as taking regular breaks and elbow positioning at 90 degrees were not significantly associated with MSS in any region (Table 3).

The most reported symptom was neck pain, followed by shoulder and wrist/forearm discomfort. The high incidence of symptoms across multiple body regions underscores the physical demands of sonographic practice and highlights the need for targeted ergonomic interventions. Several factors are significantly associated with MSS among sonography professionals. The female gender was significantly associated with shoulder pain (p = .047), suggesting a potential gender-related vulnerability in upper extremity strain. Sonographer (professional rank) reported significantly more neck pain (p = 0.036) and wrist/forearm pain (p = 0.001) than radiologists, suggesting that the professional role and scope of duties may contribute to MSS risk. For academic qualifications, bachelor's degree was more significantly associated with wrist/forearm pain compared to those with higher qualifications (MSc, Higher Diploma, or PhD) (p = 0.004), suggesting differences in ergonomic awareness or clinical workload. Employment status was significantly associated with back pain (p = 0.004), suggesting that institutional factors and workplace conditions may contribute to the development of lower back discomfort. Other variables, such as age and years of experience, were not

significantly associated with MSS across most body regions (Table 4).

Although females scanned slightly fewer patients daily than males (18 vs. 21), this difference was not statistically significant ($p = 0.218$). Years of experience were significantly related to gender, with the majority of female participants falling into the 1–5-year experience group ($p = 0.034$), suggesting a trend toward younger, less experienced females in the workforce (Table 5).

Discussion.

This study found that MSS are prevalent among sonographers. The study aims to determine the prevalence of work-related MSS among the sonography workforce and to examine its demographic, occupational, and ergonomic correlates. The results showed a dominant occurrence of MSS symptoms in conjunction with neck and shoulder pain, as well as in the wrist and forearm regions, which is consistent with anatomical literature on the intensity of sonographic work. Ergonomic and workplace-related factors that are associated with MSS and its manifestations across different body regions. These studies continue to demonstrate that unresolved MSS further complicates occupational health issues for sonographers, highlighting the need for effective ergonomic design, proper workload distribution, and adequate professional intervention and support. The study found that wrist pain was the most frequently reported MSS among the sonography professionals (sonographers), followed by neck pain and shoulder pain. The site of pain varies across studies. A meta-analysis found that neck pain was the most prevalent MSS among sonographers, followed by shoulder, upper back, lower back, and wrist [10]. Another study found that the prevalence of neck pain was highest in the neck and shoulder, followed by the lower back and wrist [11]. In contrast to previous study, which identified neck and shoulder pain as the most common MSS among sonography professionals, our study found that wrist and forearm pain are the most frequent (86%). This difference may be attributable to the specific practice context of the participating cohort: 52.1% of participants were primarily engaged in abdominal imaging (Table 1), a modality characterized by sustained transducer pressure, repetitive wrist extension and ulnar deviation, and prolonged probe manipulation against varying degrees of patient resistance. Gripping the scanner too tightly or twisting the wrist mid-exam—particularly when breaks are skipped and no ergonomic coaching has been offered- places strain on the wrist and forearm musculature, especially during prolonged sessions. Consistent with this, the significant association between the lack of an ergonomic scanning chair and wrist or forearm pain ($p = 0.015$, Table 3) further supports the role of workplace ergonomic conditions in this cohort. Additional contributing factors may include probe grip technique and the absence of ergonomic training, although these were not directly measured in our study and should be examined in future research. The study found that males and females had different rates of MSS. Female sonographers and sonologists were more likely than males to have musculoskeletal complaints. Shoulder pain was significantly more prevalent in males than in females. There could be a variety of reasons for this difference, such as a disparity in how men and women in this field experience musculoskeletal pain, and the ultrasound instrument cannot be adjusted for ergonomics. Another factor is physiological disparities in bone and muscle mass, as well as psychological differences, such as the tendency to report somatic symptoms [12]. The current study found a significant association among neck pain, wrist pain, and back pain during ultrasound examinations performed in a sitting position. The pain is more prevalent in participants who were sometimes seated during the exam. Another influencing factor is maintaining the ultrasound examinations in neutral spine positions. The pain was more prevalent among those who sometimes sat in neutral spine positions. What is more, ergonomic support is also a significant factor that affects MSS pain, specifically wrist and back pain. Therefore, maintaining a neutral spine position is essential to reduce stress on the musculoskeletal system; deviations from this alignment, particularly when prolonged or coupled with additional risk factors, may result in discomfort and physical strain. Consistently, previous studies have reported different causes of work-related musculoskeletal disorders (WRMSD) [13-16]. The study found that ergonomics significantly reduces wrist and back pain. Consistent with this finding, a previous study found that installing patient monitors and using ergonomic scanning techniques significantly reduced musculoskeletal pain [17]. An ergonomic workstation's efficiency depends on the user [18]. Inadequate ergonomic positioning of equipment is considered a factor contributing to MSS. Inadequately adjusted or non-adjustable seats, examination tables, and ultrasound machines hinder a sonographer's ability to achieve an appropriate ergonomic position for scanning. The present study revealed that employment environments substantially influenced the incidence of MSS. This variable had not been examined previously among UAE ultrasonography practitioners. It was found that participants who worked in private clinics were significantly more prone to back pain than those in governmental hospitals. In comparison with a previous study reporting that cardiac sonographers in private practice had more severe back pain than those in public institutions. Moreover, in a national survey, Huang and Zhang found that an astonishing 91% of the sonographers surveyed reported suffering from work-related musculoskeletal disorders, noting that demographic characteristics such as the workplace contributed to the prevalence of pain. The academic background of ultrasound professionals can impact their susceptibility to MSS. Our study showed that participants with a bachelor’s degree were more prone to wrist pain. This pain might be due to bachelor’s degree holders receiving less comprehensive ergonomic training. Moreover, they may lack proper ultrasound ergonomics training, increasing the likelihood of injuries and discomfort. It was found that MSS was more prevalent in sonographers than in radiologists. To the best of our knowledge, there are no studies that directly assess the comparable prevalence of MSS in sonographers and radiologists in the same clinical setting. Most of the literature has focused on sonographers as the primary risk group due to the physically demanding workload of ultrasound scanning, often neglecting radiologists, who have less direct patient contact. The absence of comparable data for

these two professional groups constitutes an important gap in occupational health research. The prevalence of MSS among ultrasound professionals is high, so it is prudent to implement preventative measures. Fixed participants must be more aware of this problem through such strategies. They must understand the negative consequences of prolonged working hours and receive instruction on proper safety protocols.

Limitations.

The study found some limitations. The small sample size (n = 71), which is smaller than the initially calculated sample size (n = 95). The small sample size may have reduced statistical power, especially in chi-square analyses of multiple categorical variables with low expected cell counts, increasing the risk of Type II errors. Because of this, there may have been other statistically significant associations that the study did not find. To increase statistical strength, future studies should include larger sample sizes. We recommend additional studies with a large sample size, including physical examinations.

Conclusion.

The study highlights critical ergonomic, occupational, and individual factors that underlie the high prevalence of MSS among sonographers. The wrist and forearm pain were the most prevalent MSS, followed by neck and shoulder pain. Significant associations existed between MSS and female gender, professional role, ergonomic practices, awkward posture, and employment setting. Healthcare institutions can reduce MSS risks by fostering ergonomic awareness, optimizing work conditions, and implementing focused ergonomic education for early-careers and bachelor-level practitioners. There is a need for longitudinal and interventional studies to promote occupational health and workforce longevity in the sonographic profession by applying these findings toward sustainable MSS preventative strategies.

List of abbreviations.

MSS: Musculoskeletal symptoms.
WRMSDs: Work-related musculoskeletal disorders.
UAE: United Arab Emirates.

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