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Relationship between upper extremity pain and ultrasound use between Perinatologist and Obstetricians and Gynecologists

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ABSTRACT

To compare the frequency and severity of upper extremity pain between perinatologists and obstetricians and gynecologists (OG) and to investigate the factors that may affect it.

This study was conducted as a prospective study between June-July 2023. The online questionnaire prepared by the researchers was filled by volunteer perinatologists and OG physicians. The questionnaire inquires information such as age, gender, specialty experience, average weekly number of patients examined, duration of examination for each patient and other demographic data, frequency and severity of upper extremity pain, and need for examination and treatment. In addition, perinatologists with upper extremity pain and OG physicians were compared and factors that may have an effect on this situation were evaluated.

One hundred and twenty four perinatologists and 210 OG physicians participated in this study. Upper extremity pain was present in 91 (73.4%) perinatologists and 77 (36.6%) OG physicians. The median value of the number of weekly ultrasound examinations was 100 (50-140) for perinatologists, while it was 70 (45-90) for OG physicians ($p < 0.001$). The examination time for each patient was 16 (15-20) minutes for perinatologists, while it was 10 (7.5-10) for OG physicians, which was significantly longer ($p<0.001$). The need for treatment was 24.2 and 5.2% for perinatologists and OG physicians, respectively, and was significantly higher for perinatologists (p: 0.001).

We found that upper extremity pain is more common in perinatologists than OG physicians. We thought that this was due to the fact that perinatologists had a higher frequency of ultrasound and longer examination times.

Keywords: Obstetrician, obstetrician and gynecologist, pain, perinatologist, ultrasound, upper extremity

Introduction

Work-related musculoskeletal disorders (WRMSD) are the most common occupational disorders worldwide and have been recognized as a problem since the 17th century (1). It is estimated that 60% of work-related injuries in the USA are caused by WRMSDs, and they cause significant workforce loss as well as causing a significant cost in healthcare (2, 3). In a study conducted in the United Kingdom, it was shown that approximately 4.1 million working days were lost due to work-related upper extremity problems in 2014/15, and this constitutes approximately 15% of all lost days due to work-related health problems (4).

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In a study, the frequency of WRMSD was found to be 75% among sonographers (5). Neck (75%), shoulders (74%), and wrists (65%) are the most affected body parts (6). Ultrasonographic examination may predispose to neck and upper extremity pain due to prolonged static posture and repetitive hand positions. (7, 8). WRMSD affects working life, reduces productivity in the working environment and may even cause chronic occupational disease (8).

In developed countries, awareness of WRMSD has increased among sonographers due to musculoskeletal pain reports and training programs (9). However, it is still not included in the occupational disease reporting system worldwide and in Turkey. There is little evidence regarding the prevalence of WRMSD among specialists using ultrasound equipment in Turkey (10).

In Turkey, obstetric ultrasonography is performed by perinatologists, obstetricians and gynecologists (OG), and radiologists. The use of ultrasound is much higher in perinatologists than OG specialists. Perinatologists may remain in uncomfortable static positions for extended periods and it may be necessary to force the hand and upper extremities holding the ultrasound probe to unusual angles in order to obtain the required ideal fetal image sections. This can cause muscle fatigue and pain in the upper extremities and neck. At the same time, long working hours and the increase in the amount of patients can also affect this situation (11).

Although there is an observation that pathologies associated with upper extremity pain are more common among perinatologists than OG physicians in clinical practice, this has not been the subject of any study. This study aims to investigate the frequency of upper extremity pain and the factors that may affect it among perinatologists and OG physicians.

Materials and Methods

This study was designed prospectively between June 2023 and July 2023. The online questionnaire was filled in by the participating volunteer perinatologists and OG physicians. Ethical approval was received from the ethics committee of the hospital (Ethics committee no: 2023/106). Our study group consists of perinatologists and OG physicians working as perinatology minor specialists in Turkey. Perinatologists and OG physicians who filled out the questionnaire and actively examined patients were included in the study. Perinatologists and OG physicians who had a previous upper extremity disorder, who had undergone medical treatment or had an operation for this reason, were excluded from the study.

Subjects such as age, gender, professional experience, weekly average number of patients, average examination time, dominant hand, and the hand used while performing ultrasound were included in the questionnaire form. In addition to the questions about demographic data, the following questions were also asked in the questionnaire: Did you experience upper extremity pain? Have you been checked for this issue? Have you been diagnosed with a disease or have you received any treatment? If there is pain, what is its frequency (every day, a few days a week, a few days a month, a few days a year) and severity (rate 1 to 10)? Do you have neck pain?

Statistical Analysis: The Kolmogorov-Smirnov test was used to assess the normality of numeric variables. For the numeric variables that were normally distributed, comparison between two groups was made by independent sample t test and descriptive statistics are presented as mean±standard deviation. For the numeric variables that were not normally distributed, comparison between two groups was made by Mann–Whitney U test and descriptive statistics are presented as median (25-75 percentiles). To analyze the categorical data, a chi-square test was used and descriptive statistics are presented as frequency (%). The p values below 0.05 were considered statistically significant.

Result

A total of 124 perinatologists and 210 OG physicians participated in the study. When the whole sample was evaluated, 91 (73.4%) of perinatologists and 77 (36.6%) of OG physicians had upper extremity pain. Demographic data, intensity of ultrasound use, and frequency of examination-treatment and interwork requirements for the two specialty groups with upper extremity pain are summarized in Table 1. The mean age of perinatologists with pain was 39.1 (±4.8) and of OG physicians was 39.6 (±5.6) and there was no significant difference between the two groups (p: 0.848). While 48 (52.7%) of the perinatologists with pain and 37 (48.1%) of the OG physicians were female, 43 (47.3%) of the perinatologists and 40 (51.9%) of the OG physicians were male (p: 0.544). The median years of professional experience of OG physicians were 14 (12.5-17), and perinatologists 6 (5-7), with

Table 1: Demographic Data For Both Specialization Groups, Frequency of Ultrasound Use and Frequency of Examination-Treatment and Interwork Requirements

	Perinatologist (n: 91)	OG* physicians (n: 77)	P
Age (years) (mean ± SD**)	39.1 (±4.8)	39.6 (±5.6)	0.848
Years of experience in the specialty (years) (median (25-75 persental))	6 (5-7)	14 (12.5-17)	<0.001
Gender, n (%)			
Woman	48 (52.7%)	37 (48.1%)	0.544
Man	43 (47.3%)	40 (51.9%)	
Number of ultrasound examinations per week (median (25-75 persental))	100 (50-140)	70 (45-90)	<0.001
Examination time for each patient (minutes) (median (25-75 persental))	16 (15-20)	10 (7.5-10)	<0.001
Dominant hand, n (%)			
Right	88 (96.7%)	76 (98.7%)	0.626
Left	3 (3.3%)	1 (1,3%)	
Inspection requirement,, n (%)			
Yes	14 (15.4%)	5 (6,5%)	0.117
No	77 (84.6)	72 (93,5%)	
Treatment requirement, n (%)			
Yes	22 (24.2%)	4 (5.2%)	0.001
No	69 (75.8%)	73 (94.8%)	
Job break, n (%)			
Yes	11 (12.1%)	8 (10.4%)	0.919
No	80 (87.9%)	69 (89.6%)	

* OG: Obstetricians and gynecologists
** SD: Standard deviation

significantly higher number of OG physicians (p<0.001). While the number of weekly median ultrasound examinations is 100 (50-140) for perinatologists, it is 70 (45-90) for OG physicians (p <0.001). The median examination time for each patient was 16 (15-20) minutes for perinatologists, while it was 10 (7.5-10) for OG physicians, significantly longer (p <0.001). In 96.7% (n:88) of dominant hand perinatologists, 98.7% (n: 76) of OG physicians are right-handed. Examination requirement was 15.4% and 6.5% for perinatologists and OG physicians, respectively, with no significant difference between the two groups (p: 0.117). The need for treatment was 24.2% and 5.2% for perinatologists and OG physicians, respectively, and was significantly higher for perinatologists (p: 0.001). The need to take a break from work was 12.1% and 10.4% for perinatologists and OG physicians, respectively, and there was no significant difference between the two groups (p: 0.919).

The severity, frequency and accompanying neck pain for both specialization groups are summarized in Table 2. The median values for the severity of pain were 5 (4-6) and 2 (2-3) among perinatologists and OG physicians, respectively, and were significantly higher for perinatologists (p <0.001). Pain was significantly more frequent for perinatologists when comparing perinatologists and OG physicians (p <0.001). 54.9% of perinatologists with pain said they had pain several times a month. Neck pain was also accompanied by 59.3% (n: 54) of perinatologists and 14.3% (n: 11) of OG physicians, and it was significantly higher for perinatologists (p<0.001).

Discussion

The results of this study were provided through an online questionnaire for perinatologists and OG physicians in Turkey. As the results of the study, upper extremity pain was detected in 73.4% of

Table 2: Intensity, Frequency and Accompanying Neck Pain For Both Specialization Groups

	Perinatologist (n: 91)	OG physicians (n: 77)	P
Pain severity (median (25-75 persental))	5 (4-6)	2 (2-3)	<0.001
Pain frequency (%)			
Every day	10 (11.0%)	2 (2.6%)	
Few days a week	25 (27.5%)	8 (10.4%)	<0,001
Few days a month	50 (54.9%)	33 (42.9%)	
A few days a year	6 (6.6%)	34 (44.2%)	
Neck Pain			
Yes	54 (59.3%)	11 (14.3%)	<0,001
No	37 (40.7%)	66 (85.7%)	

* OG: Obstetricians and gynecologists

perinatologists and 36.6% of physicians working as OG. Upper extremity pain was often accompanied by neck pain, and this rate was more common in perinatologists than in OG physicians. Upper extremity problems are quite common among WRMSD (3, 12). A growing number of studies have examined the prevalence of WRMSDs among sonographers (13-16). Among physicians, WRMSD-related upper extremity pain is most commonly encountered in vascular surgeons, radiologists, urologists, and OG physicians (12). When we examined the literature, we could not find any other study in which perinatologists were evaluated and compared with OG physicians.

Studies have shown that ergonomic factors in work life are associated with musculoskeletal symptoms (17, 18). Risk factors for WRMSDs include repetitive movements, forceful or awkward movements, pressure time, overuse of certain anatomical structures or areas, poor posture or incorrect positioning, excessive force and tension, and vibrations (19). In our study, for perinatologists, the time they allocate for a patient examination (16 vs. 10 minutes) and the number of daily and weekly ultrasounds are higher (70 vs. 100 patient examinations) than for OG physicians. Unlike perinatologists who work in the same position all day long, OG pyhsicians can work in various positions. The variety of working positions therefore causes less painful positions and intervals. In addition, perinatologists, unlike OG physicians, only examine high-risk pregnant women and evaluate each patient with ultrasound. On the other hand, the use of ultrasound in the daily practice of OG physicians is not as large as perinatologists. It is well known that sonographers have a high risk of developing WRMSD (12). In the health system in Turkey, there is no health personnel (sonographer) with sonographic examination authority other than physicians. Perinatologists examine almost entirely using ultrasound, and in this sense, they use the ultrasound probe extensively during the day.

In the study of Janga et al., it was shown that there is a positive correlation between the prevalence of musculoskeletal problems in OG physicians and the number of ultrasounds performed in a week (6). In our study, it was seen that perinatalologists applied more ultrasound than OG physicians. The number of countries where researchers have carried out studies to detect the prevalence and potential risk factors for WRMSDs among sonographers is increasing (13-15). It was stated that prevalence of WRMSD among sonographers varied between 63% to 98.7%, among which upper extremity pain was quite common (16). Simonsen et al. reported the frequency of upper extremity pain to be 61% for sonographers (7). In addition, in the continuation of this study, 35% of sonographers who did not report neck/shoulder and upper extremity pain at baseline reported this at 2.5 years of follow-up (20). In this sense, 73.4% of perinatologists in our study had upper extremity pain, and the results were similar to the rates reported for sonographers in the current literature (7, 16). Upper extremity and neck pain can arise from a lot of factors associated with performing sonography. These include staying in the same position for a long time, repetitive movements of the forearm and wrist while using the ultrasound probe, unassisted abduction of the arm, incorrect probe grip, and repetitive and continuous bending of the trunk and neck (6, 12, 21, 22).

Claes et al. reported that extremity pain was more common in ultrasonographers with more than 10 years of experience compared to those with less

than 10 years of experience (23). Cagnie et al. they also found a positive correlation trend between work experience and arm pain (24). In another study conducted among participants in obstetrics and gynecology ultrasound practice, the year the practitioners worked did not cause significant pain differences (6). In our study, it was observed that physicians working as perinatologists experienced much more upper extremity and neck pain, although their working years were shorter than OG physicians. We think that this is due to the fact that perinatologists use ultrasound more frequently and the patient examination times are longer.

Most of the physicians with upper extremity pain in both specialist groups had not been examined and did not take a break from their work. However, the need for medical treatment was found to be significantly higher for perinatologists when compared within both specialization groups. This is explained by the fact that the severity and frequency of pain experienced by perinatologists is significantly higher.

Physical ergonomic interventions are very important in preventing musculoskeletal problems associated with WRMSD (3). Generally speaking, workers should be provided with workspace and equipment based on anthropometry (such as sitting height, monitor position and height). For physicians who use intensive ultrasound, such as perinatologists, a more ergonomic approach to the configuration of the ultrasound device may be appropriate. In particular, being able to separate the screen and keyboard from the machine will reduce the physical load on the musculoskeletal system and thus reduce the risk of injury (12). It would also be helpful to train perinatologists to change their posture and movement. In order to determine the appropriate ergonomic conditions, we think that there is a need for additional studies that evaluate the faulty ergonomic situations that perinatologists encounter in their working life. Inadequate rest breaks are considered another risk factor for developing WRMSD among sonographers (12). In our study, it was observed that the examination times of perinatologists were longer than those of OG physicians. Long working times along with inadequate rest periods lead poor muscle recovery during the day (25).

Limitations of our study include the limited validity of survey studies in general, errors due to non-response, and potential bias from participants' lack of motivation, honesty, and memory. In our study, physical working conditions were not evaluated from an ergonomic point of view (such as the position of the screen, the position of the patient, the height of the table and seat, the way of using the probe) is also a limitation of our study.

In conclusion; Our study showed that the frequency and severity of upper extremity pain was significantly higher in physicians working as perinatologists. It was also shown that the severity, frequency and need for treatment of pain were significantly higher in perinatologists compared to OG physicians with upper extremity pain.

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