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Artigos Originais

THE EFFECT OF WATER AS THE WORKING MEDIUM OF THE AQUATIC PHYSIOTHERAPIST- CONTROLLED STUDY

O EFEITO DA ÁGUA COMO MEIO DE TRABALHO DO FISIOTERAPEUTA AQUÁTICO-ESTUDO CONTROLADO

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ABSTRACT

In this paper, we present the conditions of work among physical therapists working with hydrotherapy by considering the musculoskeletal symptoms (MS) and presence of water-related infections. In accordance with the STROBE guidelines, this case-control study enrolled 106 physical therapists of both genders, including 53 hydrotherapy group physical therapists (HG) and 53 control group physical therapists of other specialties (CG). The Nordic Musculoskeletal Questionnaire for MS and questions on allergic respiratory were used only once. The non-parametric Chi-square independence test was used to verify the association of frequencies of MS and infection between HG and CG. The odds ratio (OR) and 95% confidence interval (CI) were calculated. Significance level of 5% was adopted. HG had a greater chance of developing chronic symptoms in the neck (OR=2.75, CI=1.20-6.28, p=0.025) and shoulders (OR=9.6, CI=3.96-23.63, p<0.001), as well as acute symptoms in the neck (OR=3.5, CI=1.59-8.02, p=0.003) and shoulders (OR=13, CI=5.18-32.88, p<0.001). A higher percentage of respiratory tract infections was observed in HG (22.6%) than in CG (9.6%), p=0.089. Participants in HG present a greater chance of developing chronic or acute MS in the spine and upper limbs and a high percentage of respiratory infections.

Keywords: Aquatic physiotherapy, Occupational health, Ergonomics.

RESUMO

Neste artigo apresentamos as condições de trabalho dos fisioterapeutas que trabalham com hidroterapia considerando os sintomas osteomusculares (SM) e a presença de infecções relacionadas à água. De acordo com as diretrizes do STROBE, este estudo caso-controle envolveu 106 fisioterapeutas de ambos os sexos, incluindo 53 fisioterapeutas de grupo de hidroterapia (GH) e 53 fisioterapeutas de grupo controle de outras especialidades (GC). O Questionário Nórdico Musculoesquelético para EM e questões sobre alergia respiratória foram utilizados apenas uma vez. O teste não paramétrico de independência do Qui-quadrado foi utilizado para verificar a associação das frequências de SM e infecção entre GH e GC. Foram calculados o odds ratio (OR) e o intervalo de confiança (IC) de 95%. Foi adotado nível de significância de 5%. O GH teve maior chance de desenvolver sintomas crônicos no pescoço (OR=2,75, IC=1,20-6,28, p=0,025) e ombros (OR=9,6, IC=3,96-23,63, p<0,001), além de sintomas agudos no pescoço (OR=3,5, IC=1,59-8,02, p=0,003) e ombros (OR=13, IC=5,18-32,88, p<0,001). Observou-se maior percentual de infecções do trato respiratório no GH (22,6%) do que no GC (9,6%), p=0,089. Os participantes do GH apresentam maior chance de desenvolver EM crônica ou aguda na coluna e membros superiores e alto percentual de infecções respiratórias.

Palavras-chave: Fisioterapia aquática, Saúde ocupacional, Ergonomia.

revista interfaces
V. 11, N. 3 (2023) | ISSN 2317-434X
Artigos Originais

INTRODUCTION

Musculoskeletal disorders result in heavy loss of working hours every year, and a large number of workers suffer from musculoskeletal symptoms (MS) of their back, shoulders, and elbows owing to work [8]. The Canadian Center for Occupational Health and Safety [4] states that MS are a serious health problem that entails considerable economic losses and reduction in productivity. The World Health Organization defines MS as health problems of the locomotor system, including structures, such as muscles, tendons, skeletal bones, cartilage, ligaments, and nerves, along with any complaint from small transient discomforts to irreversible and incapacitating lesions [13].

Physical therapists are professionals hard hit by musculoskeletal disorders due to the great repetition of movements that cause overload in the joints and unfavorable ergonomic conditions [1-2-6].

Physical therapists specialized in hydrotherapy, as well as in other specialties, are also subject to symptoms of MS. Rehabilitation in heated water provides the treatment of several painful conditions with less demands on the joints associated with muscle relaxation and a feeling welfare. However, the same peculiarities of the aquatic environment can also cause unfavorable ergonomic conditions such as noises, high temperatures and water quality that can facilitate the appearance of diseases of the skin, cardiovascular and respiratory system [3-16].

In addition, their workload, repetitive movements mainly with the upper limbs in lifting the patient's limbs out of the water under gravity, inadequate strength and bent or twisted postures when treating certain patients or even constant muscular tension to maintain balance may predispose the professional to the onset and/or aggravation of musculoskeletal pain and lesions [16], all of which contribute to insalubrity in providing this service.

Previous studies discussed the relationship between musculoskeletal disorders in physical therapists, their demand, and work environment. In a systematic review, Vieira et al. [21] pointed out a prevalence between 53 and 91%, highlighting the lumbar region as the most affected. Lima et al [12] showed a similar prevalence (92%) in the academic environment, as well as Silva et al. [18] who observed high frequency (76.56%) of injuries to physical therapists working in the intensive care unit, with emphasis on the work-related musculoskeletal (54.69%) and respiratory damages (43.75%).

However, few studies have evaluated the frequency of musculoskeletal symptoms among physical therapists specializing in hydrotherapy. This panorama may be related to the idea that while working in water, the physical therapists would be constantly treated and prevent injuries, dispensing the need for studies in this population. Unfortunately, there is a gap in the literature on the ergonomics of the aquatic physiotherapist, which motivated the writing of the article because it is considered very important to clarify this issue for the professional's awareness, adoption of preventive and corrective measures of the risks if it is the case and who knows breaking this paradigm.

Thus, the following question arises: how does the aquatic environment influence health with regard to musculoskeletal symptoms and infections among physical therapists specializing in hydrotherapy compared to those of other specialties? We hypothesized that the frequency of musculoskeletal symptoms and infections was greater among physical therapists working in the aquatic environment. Thus, the objective of this study was to evaluate the insalubrity conditions of work, including MS and their severity, in addition to the presence of water-related infections among physical therapists specializing in hydrotherapy compared to those of other specialties.

METHODS

Study design

A case-control study described according to norms of the Strobe [12] was conducted, which enrolled physical therapists of both genders registered with the professional council and working in clinics or hospitals from the city of São Luis, Brazil, from January 2018 to January 2019.

The physical therapists participating in the research were divided into two groups: hydrotherapy group (HG) for those who work in a therapeutic pool and control group (CG) for those who work in other specialties who performed their function on land (cardiorespiratory, manual therapy, intensivists, and clinicians). The groups included physiotherapists who worked for at least one year and practiced daily four hour or more. Those who reported systemic diseases such as fibromyalgia, generalized pain syndromes and arthritis due to the possible confusion of the data collected and/or those who refused to participate in the study were excluded.

The number of physical therapists registered in the State of Maranhão, Brazil was 3992, according to Federal Council of Physiotherapy and Occupational Therapy. At least 50% of total the physical therapists work in São Luís, State of Maranhão. A sample size of 144 was used to have a confident level of 90% and a margin of error of 6.6 %.

revista interfaces
V. 11, N. 3 (2023) | ISSN 2317-434X
Artigos Originais

Data collection

All questionnaires were utilized in face-to-face interview and used only once for each individual of the sample. A sociodemographic datasheet (Fig. 1 S) was used to collect sociodemographic data and to gather information about the practice of physical, domestic, and water activities, as well as reports of infections of the cutaneous tissue, upper respiratory tract, and gastrointestinal tract. To assess the validity and question clarity of the questionnaire, seven physical therapists from academic institutions reviewed each question and a pilot test was performed. Their comments were taken into account and some items were reformulated.

The main outcome variable in this study was the presence of musculoskeletal symptoms, which were assessed using the Nordic Musculoskeletal Questionnaire (Fig. 2 S). Was used to report the prevalence acute and chronic conditions and severity index of MS of bodily regions. This questionnaire validated by Kuorinka et al [13] uses a body diagram highlighted with specific areas of the body (neck, shoulders, upper back, lower back, elbow/forearm and hand/wrist) for research participants reported the presence of MS in the last seven days (acute pain) and last twelve months (chronic pain).

The severity index ranges from 0 to 4, where 0 represents the absence of symptoms, 1 represents the report of symptoms in the last 12 months or last 7 days, 2 represents the report of symptoms in the last 12 months and last 7 days, 3 represents the report of symptoms in the last 12 months or last 7 days and limitations from activities, and 4 represents the report of symptoms in the last 12 months and last 7 days and limitations from activities [13]. Furthermore, a pain intensity scale ranging from 0 to 4 was added to the questionnaire, where 0, 1, 2, and 3 indicated no pain, mild pain, moderate pain, and severe pain, respectively.

We declare that this work was approved by the Research Ethics Committee of the University CEUMA, Maranhão State, Brazil, and the law (nº: 2.627.609) and confirm that all methods have been performed in accordance with the relevant guidelines and regulations (nº: 466/12) of Brazil. All physical therapists provided signed informed consent forms for study participation and the use of the collected data for the development of this research.

Statistical analysis

The descriptive results for qualitative data are presented as simple frequency and percentages. The qualitative data were analyzed by non-parametric Chi-square independence test to verify the association of frequencies of MS by anatomical region physiotherapists, pain intensity in the last 12 months, and infection between HG and GC. The odds ratio (OR) and 95% confidence interval (CI) were also calculated. All tests were conducted at the 5% level of probability. All statistical analyses were performed using free software R (version 4.2.0) [14].

RESULTS

Study population

Of the total of 144 physical therapists invited to participate in the study, 21 were excluded due to the lack of information in one of the applied questionnaires and 17 refused to participate in the research. Thus, only the data of 106 physical therapists who were divided into two groups, 53 in HG and 53 in CG, were analyzed.

Both groups showed a greater proportion of females (HG, 83.0%; CG, 62.3%) and those who did not have children aged ≤5 years (HG, 86.0%; CG, 90.7%). The mean ± standard deviation age was 32.6 ± 7.9 and 30.7 ± 7.1 years in HG and CG, respectively.

A higher percentage of HG showed married civil status, physical activity 1 to 2 times per week, and performance of domestic activities 1 to 2 times per week than did CG. A lower percentage of HG showed single marital status, physical activity 3 to 4 times per week, and the performance of domestic activities every day of the week than did CG.

CG presented with longer career times and longer working days than did HG. However, both groups presented an interval of 1–3 hours by shift.

Significant differences were observed between HG and CG groups regarding female sex ($p= 0.29$) and average daily working time ($p<0.001$). None of the other variables showed a significant association with respect to sociodemographic data and activities related.

When applying the chi square test to the sociodemographic characterization variables and data related to the exercise of the physiotherapist profession, significant differences in female sex ($p = 0.029$) and average daily working time ($p<0.001$) were observed between HG and CG. None of the other variables showed significant association with respect to sociodemographic data and related activities. For more details, this information is available in Table 1.

revista interfaces
V. 11, N. 3 (2023) | ISSN 2317-434X
Artigos Originais

Table 1. Sociodemographic data and activities related to the exercise of physical therapists in HG and CG.

Variables	HG, *n* (%)	CG, *n* (%)	*p**
Genders			
Female	44 (83.0)	33 (62.3)	0.029
Male	9 (17.0)	20 (37.7)	
Age range (years)			
21-30	25 (47.2)	29 (54.7)	0.565
31-40	21 (39.6)	20 (37.7)	
41-56	7 (13.2)	4 (7.6)	
Marital status			
Single	24 (45.3)	28 (52.8)	0.601
Married / Unemployed	27 (50.9)	22 (41.5)	
Divorced	2 (3.8)	3 (5.7)	
Children aged ≤ 5 years			
Yes	13 (14.0)	9 (9.3)	0.472
No	40 (86.0)	44 (90.7)	
Physical Activity (times / week)			
1 to 2	18 (34.0)	14 (9.9)	0.250
3 to 4	16 (30.2)	16 (22.5)	
4 to 6	3 (5.7)	7 (14.8)	
7 or more	1 (1.9)	5 (14.1)	
0	15 (28.3)	11 (38.7)	
Domestic Activity (times / week)			
1 to 2	20 (37.7)	18 (33.9)	0.091
3 to 4	12 (22.6)	7 (13.2)	
4 to 6	0 (0.0)	5 (9.4)	
7 or more	14 (26.4)	19 (35.8)	
0	7 (13.2)	4 (7.5)	
Career Time (years)			
1-4	34 (64.1)	26 (49.1)	0.170
5-10	19 (35.9)	27 (50.9)	
Average daily working time (hours / day)			
4-6	49 (46.2)	18 (16.9)	<0.001
7-9	4 (3.8)	29 (27.4)	
10-16	0 (0.0)	6 (5.7)	
Break time			
10-30 minutes	17 (32.1)	9 (17.0)	0.060
1-3 hours	20 (37.7)	32 (60.4)	
More than 3 hours	2 (3.8)	0 (0.0)	
No break	14 (26.0)	12 (22.6)	

HG: hydrotherapy group; CG: control group; * Chi-square test at 5% level of probability; OR: odds ratio; CI: 95% confidence intervals.

Nordic musculoskeletal questionnaire plus pain intensity scale

A total of 49 (92.45%) and 53 (100%) subjects in HG and CG, respectively, had complaints of MS in at least one of the assessed regions. A significant difference was observed between HG and CG for the subjects had complaints of MS in at least one of the assessed regions in the last 7 days (53 and 45, p = 0.010), limitations in activities owing to pain (47 and 27, p < 0.001), and seeked professional health care due to pain (48 and 39, p = 0.042), respectively. No significant was observed between HG and CG for the subjects had complaints of MS in at least one of the assessed regions in the last 12 months (53 and 49, p = 0.126).

In addition, significant differences in chronic MS for the neck, shoulders, and elbow regions were observed

revista interfaces
V. 11, N. 3 (2023) | ISSN 2317-434X
Artigos Originais

between the groups. HG was 2.7, 9.6, and 4.4 times more likely to develop chronic neck, shoulder, and elbow symptoms, respectively than was CG. None of the other regions showed a significant association with respect to chronic symptoms. A significant difference was observed in acute MS among HG subjects, who were 3.5, 13, and 2.5 times more likely to develop acute symptoms in the neck, shoulders, and thoracic spine, respectively. In the other regions, no significant association was observed with respect to acute symptoms (Table 2).

Table 2. Frequencies of musculoskeletal symptoms by anatomical region among HG and CG.

Variables	HG, *n* (%)	CG, *n* (%)	OR	95% CI	*p**
Pain in the last 7 days					
Neck	38 (71.7)	22 (41.5)	3.57	1.59-8.02	0.003
Shoulders	42 (79.2)	12 (22.6)	13.05	5.18-32.88	<0.001
Upper back	30 (56.6)	18 (33.9)	2.54	1.16-5.57	0,031
Elbows	10 (18.8)	5 (9.4)	2.23	0.71-7.05	0,265
Fists/Hand	13 (24.5)	15 (28.3)	0.82	0.35-1.96	0.825
Lower back	12 (22.6)	15 (28.3)	0.74	0.31-1.78	0.655
Hip/ Thighs	7 (13.2)	7 (13.2)	1.00	0.32-3.08	0.999
Knees	9 (16.9)	7 (13.2)	1.34	0.46-3.92	0.786
Ankles/Feet	9 (16.9)	3 (5.7)	3.41	0.87-13.39	0.125
Pain in the last 12 months					
Neck	40 (75.4)	28 (52.8)	2.75	1.20-6.28	0.025
Shoulders	42 (79.2)	15 (28.3)	9.67	3.96-23-63	<0.001
Upper back	34 (64.1)	25 (47.2)	2.00	0.92-4.37	0.117
Elbows	14 (26.4)	4 (7.5)	4.40	1.34-14.43	0.019
Fists/Hand	15 (28.3)	18 (33.9)	0.77	0.34-1.75	0.674
Lower back	20 (37.7)	21 (39.6)	0.92	0.42-2.02	0.999
Hip/ Thighs	16(30.2)	7 (13.2)	2.84	1.06-7.63	0.059
Knees	13 (24.5)	8 (15.1)	1.83	0.69-4.86	0.329
Ankles/Feet	13 (24.5)	6 (11.3)	2.55	0.89-7.31	0.128
Limitations in activities owing to pain					
Neck	24 (45.4)	10 (18.9)	3.56	1.48-8.54	0.007
Shoulders	32 (60.4)	6 (11.3)	11.94	4.34-32.85	<0.001
Upper back	23 (43.4)	9 (17.0)	3.75	1.52-9.21	0.006
Elbows	8 (15.1)	1 (1.9)	9.24	1.11-76.77	0.036
Fists/Hand	12 (22.6)	7 (13.2)	1.92	0.68-5.35	0.311
Lower back	8 (15.1)	9 (17.0)	0.87	0.31-2.46	0.999
Hip/ Thighs	4 (7.5)	3 (5.7)	1.36	0.29-6.40	0.999
Knees	8 (15.1)	4 (7.5)	2.18	0.61-7.73	0.357
Ankles/Feet	5 (9.4)	3 (5.7)	1.74	0.39-7.67	0.713
Seeked professional health care due to pain					
Neck	23 (43.4)	18 (34.0)	1.49	0.69-3.27	0.425
Shoulders	33 (62.3)	12 (22.6)	5.64	2.41-13.19	<0.001
Upper back	25 (47.2)	16 (30.2)	2.06	0.93-4.58	0.110
Elbows	5 (9.4)	4 (7.5)	1.28	0.32-5.04	0.999
Fists/Hand	9 (17.0)	13 (24.5)	0.63	0.24-1.63	0.472
Lower back	7 (13.2)	14 (26.4)	0.42	0.16-1.16	0.143
Hip/ Thighs	4 (7.5)	5 (9.4)	0.78	0.20-3.10	0.999
Knees	6 (11.3)	5 (9.4)	1.23	0.35-4.29	0.999
Ankles/Feet	6 (11.3)	1 (1.9)	6.64	0.77-57.19	0.117

HG: hydrotherapy group; CG: control group; * Chi-square test at 5% level of probability; OR: odds ratio; CI: 95% confidence intervals.

revista interfaces
V. 11, N. 3 (2023) | ISSN 2317-434X
Artigos Originais

As for pain intensity, a significant difference was observed between HG and CG only for the neck (p = 0.06), shoulders (p < 0.01), thoracic spine (p = 0.012), elbows (p = 0.016), and ankles and feet (p = 0.012) (Table 3).

Table 3. Evolution of pain intensity among physical therapists in hydrotherapy group HG and CG after 12 months of work.

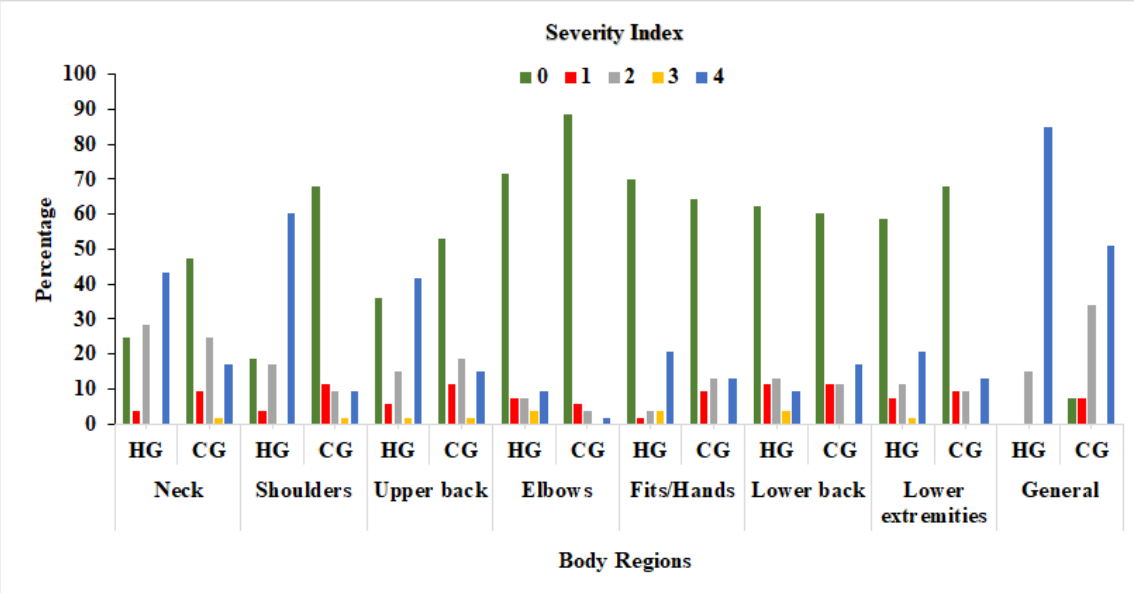
Questions	Pain intensity				*p**
	No pain	Mild pain	Moderate pain	Severe pain	
	n (%)	*n* (%)	*n* (%)	*n* (%)	
Neck					
HG	12 (22.6)	19 (35.9)	20 (37.7)	2 (3.7)	0.066
CG	25 (47.1)	13 (24.5)	13 (24.5)	2 (3.7)	
Shoulders					
HG	9 (16.9)	14 (26.4)	24 (45.2)	6 (11.3)	<0.001
CG	36 (67.9)	6 (11.3)	11 (20.8)	0 (0)	
Upper back					
HG	18 (33.9)	5 (9.4)	17 (32,1)	13 (24.5)	0.012
CG	29 (54.7)	8 (15.1)	13 (24.5)	3 (5.6)	
Elbows					
HG	37 (69.8)	6 (11.3)	8 (15,1)	2 (3,7)	0.016
CG	49 (92.5)	0 (0)	3 (5.7)	1 (1.9)	
Fists/Hand					
HG	38 (71.7)	7 (13.2)	7 (13.2)	1 (1.9)	0.871
CG	35 (66,0)	9 (17.0)	7 (13.2)	2 (3.7)	
Lower back					
HG	32 (60.4)	14 (26.4)	5 (9.4)	2 (3.7)	0.376
CG	33 (62.3)	9 (17.0)	10 (18.9)	1 (1.9)	
Hip/Thighs					
HG	37 (69.8)	11 (20.7)	3 (5.6)	2 (3.7)	0.052
CG	46 (86.8)	3 (5.7)	4 (7.6)	0 (0)	
Knees					
HG	40 (75.4)	7 (13.2)	6 (11.3)	0 (0)	0.252
CG	46 (86.8)	5 (9.4)	2 (3.8)	0 (0)	
Ankles/Feet					
HG	40 (75.5)	12 (22.6)	1 (1.9)	0 (0)	0.012
CG	48 (90.6)	2 (3.8)	3 (5.7)	0 (0)	

HG: hydrotherapy group; CG: control group; * Chi-square test at 5% level of probability.

Regarding the level of severity by body region, HG showed predominance of index 4 in all regions except lower limbs, whereas CG showed predominance of index 0 in all regions. Both groups presented a predominance of index 4 (Fig. 1) a significant difference in the neck, shoulder, upper back, and elbows was observed between the groups (Fig. 3 S).

revista interfaces
V. 11, N. 3 (2023) | ISSN 2317-434X
Artigos Originais

Fig 1. Severity index among physical therapists in hydrotherapy group (HG) and control groups (CG). Severity index concerning the nine body regions and that in general among the hydrotherapy group physical therapists and physical therapists of the other specialties supplied by the Nordic Musculoskeletal Questionnaire.



Higher percentages of individuals in HG than those in CG reported upper respiratory tract and skin infections, however no significant difference was observed. Nonetheless, p value pointed towards a tendency of HG professionals to contract infections. There was no report of otitis or hepatitis A and gastroenteritis (Table 4).

Table 4. Infection among physical therapists in HG and CG after 12 months of work.

Infection	HG, n (%)	CG, n (%)	*p**
Upper respiratory tract	12 (22.6)	5 (9.6)	0.089
Cutaneous	3 (5.7)	2 (3.8)	0.654
Otitis	0 (0)	0 (0)	-
Hepatitis A or Gastroenteritis	0 (0)	0 (0)	-

HG: hydrotherapy group; CG: control group; * Chi-square test 5% level of probability

DISCUSSION

Our hypothesis that physical therapists working in aquatic environments would have a higher frequency of MS and a higher number of infections was confirmed. In conditions of chronic symptomatology and acute conditions, HG had a greater chance of developing MS or infections. In fact, in the shoulder and cervical regions, HG was 13 and 9.6 times more likely to develop MS or infections than CG. Furthermore, HG had more upper respiratory tract infections such as infections in the epidermis than CG.

Although it is not possible to establish a direct cause and effect relationship between working with hydrotherapy and musculoskeletal pain, due to the design of this study and the HG volunteers also working on the ground, the greater frequency of symptoms observed is notorious observed in HG seems to be related to the manner in which aquatic therapy is performed. The characteristic features of water (e.g., buoyancy, warm temperature, and hydrostatic pressure) are beneficial for the aquatic physical therapists when they are together with the patient in the therapeutic pool. When the upper body of the professional stays out of the water, this region experiences the effects of gravity and non-ergonomic movements (repetitive, intense, and above 90° or up to the limit of amplitudes) when maneuvering and elevating the patient's limbs.

Consequently, without the aid of the thrust that decreases body weight and is against gravity, situations that are aggravated by the constant maintenance of the orthostatic posture and balance against the turbulence of the water during the whole work routine are affected, thereby causing muscular tension of the shoulder girdle.

Furthermore, the higher frequency of symptoms may also be related to the lower age presented in HG since younger physical therapists are more vulnerable to the development of MS and more experienced physical therapists develop strategies to deal with the physical demands of their work [14-20].

The results from the severity index and pain scale added to the Nordic Musculoskeletal Questionnaire reinforce the findings of this study, demonstrating that the upper body (neck, shoulders, thoracic spine, and elbows) was most affected in HG by their professional activity, resulting in MS and pain. Since HG usually works on immersion at the xiphoid process level of the sternum bone, the upper body is exposed to gravity, making that region more susceptible to muscle tensions and consequently to musculoskeletal complaints such as discomfort and pain. To the best of our knowledge, this is the first study addressing the severity of complaints in HG.

Overall, HG not only has a higher chance of developing MS, but also presents with a higher severity level of these symptoms than CG. It is still important to note that the unhealthy working conditions of HG are mainly associated with their working environment and the constant need to perform repetitive movements with the upper body, while the lower body seems to benefit from immersion in heated water.

A difference was observed between the two groups, with a higher percentage in HG than in CG for upper respiratory tract infections. These results corroborate with studies that reported that the hot, humid and highly rotating environment of the therapeutic pool is very conducive to the proliferation of viruses and bacteria [11-17]. In addition, the inhalation of volatilized by-products, formed by the reaction of disinfectants applied to maintain the water with organic materials released by the users of the pool, is very toxic and associated with various signs and symptoms such as eye irritation, respiratory irritation, and dyspnea [5-7-8-19].

Thus, the presented results indicate that the work activity of HG has a potential risk of MS. Therefore, it is necessary to avoid and raise awareness about the occurrence and aggravation of their musculoskeletal conditions. Thus, both hydrotherapy physical therapists and employers responsible for the work environment of these professionals should consider that although the water environment is a facilitator for the treatment, several activities performed by the upper limbs are performed above the water level. Therefore, preventive measures should be taken to avoid extreme amplitude movements and heavy weight manipulation; avoid pauses and follow-up practices between appointments to prevent skeletal muscle injuries; and frequently clean and analyze water quality pool to mitigate the possibility of contracting upper respiratory tract and skin infections.

The limitations of this study were the difficulty in finding physical therapists personally working in an aquatic environment, small population size and sample size of study and the few numbers of responses received from these professionals. However, these results will serve as a parameter for future research and studies with larger sample sizes may help to address these aspects. Another limitation was the impossibility of establishing a cause and effect relationship due to the study model used. However, the design used and tools validated in the evaluation can be used to establish an association or relationship between the observed complaint and salubrity of the conditions of the work activity.

CONCLUSIONS

The work environment and work activities of the physiotherapist's hydrotherapy exposes the significant frequency of MS and increased risk of these acute or chronic symptoms compared to those in physical therapists of other specialties. Furthermore, the greater number of reports of infections demonstrated that these professionals are more vulnerable due to the peculiarities of their profession.

This study, besides helping to fill a gap in the literature, could serve as a basis for future research and actions in both the public and private spheres focused on the ergonomic conditions of work activity in the aquatic environment and as a starting point for longitudinal studies.

DECLARATION OF COMPETING INTERESTS

The authors declare that they do not have any potential competing and financial interests.

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