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Prevalence of musculoskeletal disorders in Azar cohort population in Northwest of Iran

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Abstract Musculoskeletal disorders (MSDs) are considered as major public health problems. The purpose of this study was to determine the prevalence of MSDs in Azar cohort population in northwest of Iran. Azar cohort study is a state level of a national cohort project (PERSIAN) which began in 2014. All adults over 35 years old in Khamene city in East Azarbaijan province were recruited for the pilot phase of the Azar cohort. For the purpose of the current study, a total of 952 subjects age range of 35–70 who completed the Community Oriented Program for the Control of Rheumatic Disease (COPCORD) questionnaire as supplementary were included. 299 subjects had MSDs and were introduced to the rheumatologist, only 237 of them referred for further assessment. 33.4% of subjects had MSDs within the past 7 days. The most frequent complaint was pain and the most common sites of complaints were knee, lumbar spine, and shoulder, respectively. Osteoarthritis was the most common rheumatic disease (53.2%) and the knee was the most common region affected (47.7%) followed by low back pain (28.2%). Osteoarthritis and knee osteoarthritis were present in 56.1 and 51.8% of females and 46.6 and 38.4% of males, respectively. Furthermore, low back pain was present in 32.9% of males and 26.2% of females. Periarthritis was more prevalent in males (12.3%), whilst fibromyalgia, psychologic pain, and heel spur were prevalent among females (9.1, 5.1, and 1.2%, respectively). Rheumatoid arthritis was observed in 1.4% of males and 1.8% of females, respectively. Prevalence of MSDs is very high in this area. Therefore, it calls for action by heath officials and professionals to plan for appropriate programs of prevention and management of MSDs in society.

Keywords COPCORD · Musculoskeletal complaints · Prevalence · Iran

Introduction

Musculoskeletal disorders (MSDs) are defined as injuries and disorders in different parts of the body, including muscles, nerves, tendons, ligaments, joints, cartilage, and spinal [1, 2]. MSDs are multi-factorial disorders caused by a variety of genetic, anatomical, biomechanical, and psychosocial factors [3].

These disorders are considered as major public health problems that impose significant costs to the individual and society [2, 4]. The prevalence of this health problem has been increasing and it is predicted to continue to increase in the future [5]. Today, the MSDs are the most important occupational health challenges around the world and are prevalent among almost all the occupations, so that most people experience musculoskeletal pain during their life [6]. It has been reported that musculoskeletal complaints are responsible for more than 315,000,000 outpatient visits every year in the United States [7]. Furthermore, it has been indicated that prevalence of musculoskeletal pain among women is more common [8, 9]. However, the knowledge

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about the burden of MSDs in developing countries is lower than that in developed countries. Community Oriented Program for Control of Rheumatic Diseases (COPCORD) was proposed and designed by the World Health Organization (WHO) and the International League of Associations for Rheumatology (ILAR) for estimating the prevalence of MSDs and rheumatic diseases in developing countries. A few studies on MSDs prevalence have so far been conducted in Iran, including the COPCORD study in Tehran, and rural areas in the northern suburbs of Tehran as well as five villages in Tuyserkan, a small town in the northwest of Iran, urban areas in Zahedan, southeastern Iran, and Sanandaj [10–14].

Understanding the prevalence and complications of skeletal system deviations is necessary for preventing the occurrence of these disorders in the community. In addition to being more convenient and less expensive, prevention is of higher priority than treatment today. Prevention helps cutting exorbitant treatment costs and improves social and mental health. Determining the prevalence and pattern of musculoskeletal disorders is the first step in prevention, diagnosis, and treatment of these disorders. Patients with musculoskeletal problems often present to primary care with a regional symptom, such as back, knee, or shoulder pain. Many musculoskeletal symptoms cannot be labeled with a diagnosis initially and general physicians often find it more useful to work with a regional pain label than a complex diagnostic label.

The aim of this study was to determine the prevalence of musculoskeletal disorders in the pilot phase of the Azar cohort study which is a state level of The **P**rospective **E**pidemiological **R**esearch **S**tudies of the **I**ranian **a**dults (**PERSIAN**) cohort study (http://www.persiancohort.com) and subjects for this study include all individuals 35–70 years old in Khameneh city (pilot site of the Azar cohort) in East Azarbaijan province who had completed a supplementary questionnaire.

Methods

Subjects

The Azar cohort study is a state level of the PERSIAN cohort study which is a nationwide cohort study launched in the year 2014 in different geographically regions of Iran mainly aimed to assess a comprehensive range of different biomarkers, lifestyle, socioeconomic factors, and health-related factors of common non-communicable diseases among Iranian adults (http://www.persiancohort.com).

Shabestar, a county located in East Azarbaijan province, was a selected place for the Azar cohort study. This study is running by Tabriz University of Medical

Sciences. All people 35 to 70 years of age are invited to take a part in this study if they meet the inclusion criteria (permanent resident of this city, ability to response to the questions, and Iranian originality). The pilot phase of the Azar cohort study was conducted between October 2014 and January 2015 in Khameneh, one of the cities of the Shabestar County, where has total health coverage. Therefore, all of the Azar cohort population have health records in the Khameneh healthcare center. In the pilot phase, in addition to PERSIAN questionnaire, measurements, and laboratory tests, a supplementary questionnaire, fully medical examination, and additional tests were collected. A total of 1236 persons 35 years and above were invited to attend the center, 1125 persons were in age range of 35–70 years, of whom 952 persons were attended the study site (participation rate 85%).

The project received ethics approval from ethics committee of the Tabriz University of Medical Sciences, The written informed consent was taken from all subjects before collecting the data.

Questionnaire

The Persian version of the COPCORD Core Questionnaire (CCQ) which had been validated in the Tehran COPCORD study [10] was applied for this study. The original CCQ comprised seven main sections: background information, work history, pain/tenderness/swelling/stiffness during the last week, and in the past, functional disability, difficulty in performing specific tasks, treatment, and evaluation. For the COPCORD study in Iran, a section was added for extra-articular symptoms of some rheumatic diseases like aphthous ulcers and blurred vision.

Diagnosis

From 952 subjects who were entered the study and completed the CCQ, only 299 individuals had musculoskeletal complaints. These individuals were introduced to the rheumatologist for further physical examination to make diagnosis according to the American College of Rheumatology (ACR) classification criteria.

Statistical analysis

Statistical analysis was performed using SPSS version 16.0 software (SPSS, Inc., Chicago, IL, USA). Qualitative and quantitative variables were displayed as numbers (percentages) and means ± SD, respectively.

Results

General characteristics of study participants and those who had musculoskeletal complains are presented in Table 1. The mean age of study population was 49.84 (SD = 8.82) years. The majority of them were married (91.7%), only 12% had no formal education, 545 were women, 40% were housewife, about 39% were employed, and the rest were retired or unemployed. Of 952 subjects who were entered the study and completed the CCQ, only 299 individuals (204 females and 95 males) had musculoskeletal complaints. Mean age of the participants was 52.39 ± 7.97 years (age range 36–70).

Of 299 individuals who had musculoskeletal complaints, only 237 subjects referred to the rheumatologist for further assessment. Only 33.4% ($n = 100$) of subjects had musculoskeletal complaints within the past 7 days prior to the interview, 28.76% ($n = 86$) of participants did not have any complaints within the past 7 days prior to the interview but had musculoskeletal complaints previously which continued for at least 1 month and 38.1% ($n = 114$) of subjects had problems, such as pain, swelling, and stiffness, both previously and within the past 7 days prior to the interview. The age and location distribution of pain, stiffness, and tenderness in females and males are shown in Tables 2 and 3, respectively. The

Table 1 Demographic characteristics of study population ($n = 952$) and subjects with musculoskeletal complaints ($n = 299$)

Characteristics	Study population n (%)	Subjects with musculoskeletal complaints n (%)
Sex		
Male	436 (45.8)	95 (31.8)
Female	516 (54.2)	204 (68.4)
Age group		
<49	479 (50.3)	113 (37.8)
50–59	327 (34.3)	128 (42.8)
>60	146 (15.3)	58 (19.4)
Education		
Illiterate	114 (12.0)	14 (4.7)
Non-diploma	457 (48.0)	147 (49.1)
Diploma	201 (21.1)	56 (18.7)
Upper-diploma	180 (18.9)	82 (27.5)
Job		
Housewife	381 (40.0)	162 (54.2)
Employee	148 (15.5)	49 (16.4)
Self-employed	164 (17.2)	31 (10.4)
Retired/unemployed	91 (1.4)	24 (8.0)
Farmer	50 (5.3)	12 (4.0)
Driver	48 (0.5)	11 (3.7)

All values are n (%)

Table 2 Distribution of musculoskeletal complaints in females ($n = 204$)

Location	Complaint[a]	Age groups			
		30–39	40–49	50–59	>60
Shoulder	Pain	1 (11.1)	10 (14.7)	22 (25.6)	4 (9.8)
	Stiffness	–	1 (1.5)	4 (4.7)	–
	Tenderness	1 (11.1)	4 (5.9)	6 (7)	–
Elbow	Pain	1 (11.1)	6 (8.8)	15 (17.4)	2 (4.9)
	Stiffness	–	1 (1.5)	2 (2.3)	–
	Tenderness	1 (11.1)	4 (5.9)	5 (5.8)	–
Wrist	Pain	1 (11.1)	8 (11.8)	12 (14)	1 (2.4)
	Stiffness	–	–	1 (1.2)	–
	Tenderness	–	3 (4.4)	3 (3.5)	–
Palm and Fingers	Pain	–	8 (11.8)	10 (11.6)	2 (4.9)
	Stiffness	–	–	2 (2.3)	–
	Tenderness	–	3 (4.4)	2 (2.3)	–
Hip	Pain	–	1 (1.5)	8 (9.3)	1 (2.4)
	Stiffness	–	–	1 (1.2)	–
	Tenderness	–	–	1 (1.2)	–
Knee	Pain	4 (44.4)	32 (47.1)	37 (43)	26 (63.4)
	Stiffness	1 (1.1)	9 (13.2)	6 (7)	4 (9.8)
	Tenderness	1 (1.1)	7 (10.3)	5 (5.8)	6 (14.5)
Ankle	Pain	–	5 (7.4)	8 (9.3)	2 (4.9)
	Stiffness	–	–	1 (1.2)	–
	Tenderness	–	3 (4.4)	3 (3.5)	–
Foot joint	Pain	–	2 (2.9)	2 (2.3)	1 (2.4)
	Stiffness	–	–	1 (1.2)	–
	Tenderness	–	1 (1.5)	–	–
Neck	Pain	1 (11.1)	7 (10.3)	7 (7)	3 (7.3)
	Stiffness	–	3 (4.4)	2 (2.3)	–
	Tenderness	–	4 (5.9)	–	–
Lumbar spine	Pain	2 (22.2)	20 (29.4)	21 (24.4)	13 (31.7)
	Stiffness	–	2 (2.9)	2 (2.3)	1 (2.4)
	Tenderness	–	2 (2.9)	–	2 (4.9)

All values are n (%)

[a] Three complaints of pain, stiffness, and tenderness are reported for each location of musculoskeletal system

most frequent complaint was pain and the most common sites of complaints were knee, lumbar spine, and shoulder, respectively (Tables 2, 3).

As indicated in Table 4, osteoarthritis (OA) was the most common rheumatic disease in examined subjects (53.2%) and the knee was the most common region affected in both males and females (47.7%). Low back pain was the second most common rheumatic disease (28.2%) in studied subjects. In addition to 46 (19.4%) cases of non-inflammatory low back pain, there were 5 (2.1%) cases of lumbar lordosis, 2 (0.8%) cases of spondylilisthesis, 1 (0.4%) case of spinal stenosis, and 13 (5.5%) cases of lumbar discopathy, all of which considered as mechanical low back pain. Neck

Table 3 Distribution of musculoskeletal complaints in males ($n=95$)

Location	Complaint[a]	Age groups			
		30–39	40–49	50–59	>60
Shoulder	Pain	–	4 (11.8)	2 (4.8)	3 (17.6)
	Stiffness	–	–	–	–
	Tenderness	–	1 (2.9)	–	1 (5.9)
Elbow	Pain	–	3 (8.8)	7 (16.7)	2 (11.8)
	Stiffness	–	–	1 (2.4)	–
	Tenderness	–	1 (2.9)	4 (9.5)	1 (5.9)
Wrist	Pain	–	1 (2.9)	–	1 (5.9)
	Stiffness	–	–	–	–
	Tenderness	–	–	–	1 (5.9)
Palm and Fingers	Pain	–	–	1 (2.4)	2 (11.8)
	Stiffness	–	–	–	–
	Tenderness	–	–	–	1 (5.9)
Hip	Pain	–	–	4 (9.5)	2 (11.8)
	Stiffness	–	–	–	–
	Tenderness	–	–	–	2 (11.8)
Knee	Pain	–	10 (29.4)	15 (35.7)	9 (52.9)
	Stiffness	–	1 (2.9)	2 (4.8)	2 (11.8)
	Tenderness	–	4 (11.8)	1 (2.4)	4 (23.5)
Ankle	Pain	–	1 (2.9)	2 (4.8)	2 (11.8)
	Stiffness	–	–	–	–
	Tenderness	–	1 (2.9)	–	2 (11.8)
Foot joint	Pain	–	–	–	–
	Stiffness	–	–	–	–
	Tenderness	–	–	–	–
Neck	Pain	–	1 (2.9)	–	1 (5.9)
	Stiffness	–	–	–	–
	Tenderness	–	–	–	–
Lumbar spine	Pain	2 (100)	6 (17.6)	10 (23.8)	3 (17.6)
	Stiffness	–	1 (2.9)	2 (4.8)	–
	Tenderness	–	–	1 (2.4)	–

All values are n (%)

[a] Three complaints of pain, stiffness, and tenderness are reported for each location of musculoskeletal system

Table 4 Frequency of musculoskeletal disorders in studied subjects ($n=237$)

Musculoskeletal disorder	%	95% confidence interval
All types of osteoarthritis	53.2	46.8–59.5
Knee osteoarthritis	47.7	41.3–54
Low back pain	28.2	22.5–34
Periarthritis[a]	9.3	5.5–12.9
Fibromyalgia	6.3	3.2–9.4
Lumbar discopathies	5.5	2.6–8.4
Tennis elbow	4.6	1.9–7.3
Carpal tunnel syndrome	4.2	1.7–6.8
Psychologic pain	3.8	1.4–6.2
Myofacial pain	3.8	1.4–6.2
Neck pain	2.5	0.5–4.5
Rheumatoid arthritis	1.3	0–3.9
Knee monoarthritis	0.8	0–3.4
Familial Mediterranean fever (FMF)	0.8	0–3.4
Heel spur	0.8	0–3.4
Osteomalacia	0.4	0–2.6
Gout	0.4	0–2.6
Palindromic rheumatism	0.4	0–2.6
Golf elbow	0.4	0–2.6
Trigger finger	0.4	0–2.6

[a] Periarthritis includes disorders of capsulitis, bursitis, tenosynovitis, biceps tendonitis, golf elbow, and tennis elbow

mediterranean fever were observed in 1.4% of males, whilst they were present in 1.8 and 0.6% of females, respectively. Moreover, carpal tunnel syndrome and myofacial pains were observed in 1.4 and 2.7% of males and 5.3 and 4.3% of females, respectively.

discopathy (1.7%), neck pain (0.4%), and overuse neck pain (0.4%) were considered as mechanical neck pain.

Table 5 shows the prevalence of common musculoskeletal disorders based on sex and age group. As indicated in Table 5, musculoskeletal complaints were more common in women than in men. OA and knee OA were present in 56.1 and 51.8% of females and 46.6 and 38.4% of males, respectively. Furthermore, low back pain was present in 32.9 of males and 26.2% of females. In addition, discopathies were present in 5.5 of males and 7.9% of females, respectively. Peri-arthritis was more prevalent in males (12.3%) than in females (6.3%). Fibromyalgia, psychologic pain, and heel spur were prevalent among females (9.1, 5.1, and 1.2%, respectively). Rheumatoid arthritis and familial

Discussion

This study was carried out to assess the prevalence of musculoskeletal complaints in Azar cohort population in 2014–2015. Azar cohort is a national cohort project which began to assess the role of modifiable and non-modifiable risk factors in morbidity and mortality of chronic diseases. Epidemiological studies describing the frequency, distribution, and determining factors of diseases are an important initial strategy to design policies regarding disease prevention and management [12]. The use of the CCQ has been proved to be a useful tool for detecting cases of rheumatic diseases with the possibility to designate those patients as soon as possible to a rheumatologist or set priorities in the primary care setting [15, 16].

This study showed that prevalence of musculoskeletal complaints within the preceding 7 days was 33.4%.

Table 5 Distribution of common musculoskeletal disorders in studied subjects ($n = 237$)

Musculoskeletal disorders	Gender	Age groups			
		30–39	40–49	50–59	>60
All osteoarthritis[a]	Male	–	10 (38.5)	13 (41.9)	11 (78.6)
	Female	1 (16.7)	29 (50.0)	41 (59.4)	21 (67.7)
Knee osteoarthritis	Male	–	7 (26.9)	11 (35.5)	10 (71.4)
	Female	1 (16.7)	29 (50)	34 (49.3)	21 (67.7)
Rheumatoid arthritis	Male	–	1 (3.8)	–	–
	Female	–	1 (1.7)	–	1 (3.2)
Low back pain	Male	1 (50.0)	9 (34.5)	13 (41.9)	1 (7.1)
	Female	–	19 (32.8)	23 (26.0)	6 (19.4)
Neck pain	Male	–	–	1 (3.2)	–
	Female	–	3 (5.1)	2 (2.8)	–
Discopathies	Male	–	1 (3.8)	1 (3.2)	1 (7.1)
	Female	–	5 (8.6)	6 (8.7)	2 (6.5)
Carpal tunnel syndrome	Male	–	–	1 (3.2)	–
	Female	–	3 (5.1)	5 (7.2)	1 (3.2)
Golf elbow	Male	–	1 (3.8)	–	–
	Female	–	–	–	–
Tennis elbow	Male	–	1 (3.8)	3 (9.7)	–
	Female	–	5 (8.6)	2 (2.9)	–
Periarthritis[b]	Male	–	3 (11.5)	6 (19.3)	–
	Female	–	6 (10.3)	5 (7.2)	2 (6.4)
Fibromyalgia	Male	–	–	–	–
	Female	1 (16.7)	5 (8.6)	8 (11.6)	1 (3.2)
Psychologic pain	Male	–	–	–	–
	Female	2 (33.3)	2 (3.4)	2 (2.9)	3 (9.7)
Myofacial pains	Male	1 (50)	–	1 (3.2)	–
	Female	–	3 (5.2)	4 (5.8)	–
Knee monoarthritis	Male	–	–	–	2 (14.3)
	Female	–	–	–	–
Familial mediterranean fever	Male	–	–	1 (3.2)	–
	Female	–	1 (1.7)	–	–
Heel spur	Male	–	–	–	–
	Female	–	1 (1.7)	2 (2.9)	–
Trigger finger	Male	–	–	0 (0)	–
	Female	–	–	1 (1.4)	–
Palindromic rheumatism	Male	–	1 (3.8)	–	–
	Female	–	–	–	–

All values are n (%)

[a] All types of osteoarthritis

[b] Periarthritis includes disorders of capsulitis, bursitis, tenosynovitis, biceps tendonitis, golf elbow, and tennis elbow

Results of COPCORD studies in Iran indicated that prevalence of these complaints was 41.9, 42.8, 66.6, and 54.13% in Tehran, Sanandaj, Tuyserkan, and Zahedan, respectively [10, 12–14] which were greater than that in our study. Frequency of rheumatic complaints by the COPCORD model in the Asian-Pacific region was 40% in China (Beijing) [17], 34% in Australia [18], and 33% in Australian Aborigines [19] which were consistent with our study. In contrast with this study, the reported prevalence of MSDs was 9.7% in China, Shantou [17], 14.5% in Vietnam [20], and 14.8% in Pakistan [21]. Furthermore, the reported prevalence of MSD pain in recent COPCORD studies in Pune (14.1%) [22], Mexico (19.6%) [23], and Lebanon (24.4%) [24] was lower than our study. The difference in the prevalence of musculoskeletal complaints in different regions can be explained

by diverse sample size and randomization, and cultural, socioeconomic, and genetic factors.

According to this study, the most frequent complaint was pain and the most common sites of complaints were knee, lumbar spine, and shoulder, respectively. This emphasizes on how important the knowledge of diseases affecting those regions is to the strategies for the healthcare system, just as well as early hospitalization and prevention of disabilities are likely to reduce costs. Furthermore, the most frequent diagnosed diseases were OA of the knee followed by low back pain. Based on COPCORD studies in Iran, the most commonly affected sites were knee, dorsolumbar, shoulder, and neck which were consistent with this study. Similarly, knee (7–41%) and low back pain (6–35%) were the most frequent pain sites in all other COPCORD studies [25]. However, the most prevalent musculoskeletal complaints were shoulder pain (14.3%) in Lebanon [24] and knee pain (12.1%) followed by hand pain (8.2%) in Mexico [23]. In contrast with this study, the frequency of OA was 18.66% in Zahedan [13] compared to 16.6% in Tehran [10], 19.4% in Sanandaj [14], and 20.5% in Tuyserkan [12]. In other COPCORD studies, the prevalence varied from 4% in Lebanon [24] to 11.3% in Thailand [26]. The prevalence of knee OA was 47.7% in our study which was higher than Zahedan (15.29%) [13], Tehran (15.3%) [10], Tuyserkan (19.3%) [12], and Sanandaj (18.8%) [14]. In comparison with other COPCORD studies, a remarkable finding was high frequency of OA in Iran which might be related to the lifestyle and living conditions in this area.

Based on our study, the prevalence of low back pain was 28.2% which was higher than those reported in other COPCORD studies in the Asian countries and Australia [19, 21, 26–28]; Whilst in the north of China, the percentage of people having low back pain (35%) is much higher than in our study [29, 30]. Fibromyalgia was seen more frequently in our study than in Tehran (0.7%) [10], rural areas in Iran (0.06%) [11], Zahedan (2.7%) [13], Sanandaj (0.6%) [14], and other COPCORD studies in Asian countries (0.01% in Malaysia, 1.3% in Egypt, and 2.1% in Pakistan) [21, 28, 31]. Moreover, fibromyalgia affected 3.3% of adults in London, Canada [32] which was in contrast with our study. In the current study, the prevalence of neck pain was 2.5% which was similar to that in Egypt [31] and China, Shantou [17], but lower than those in other COPCORD studies in Thailand [26], India [27], and Malaysia [28]. Moreover, other mechanical disorders in this study included carpal tunnel syndrome 4.2%, tennis elbow 4.6%, golfer's elbow 0.4%, and trigger finger 0.4%, which were similar to the values reported in COPCORD study in Sanandaj [14] but higher than the COPCORD study carried out in Tuyserkan, Iran [12].

In the current study, the prevalence of RA was 1.3% which was similar to that in Zahedan [13] but higher

than those in Tehran [10], rural areas of Tuyserkan [12] and Sanandaj [14]. These figures were the same as that reported in studies conducted in Iraq (1%) [33], Lebanon (1%) [24], Kuwait (0.7%) [34], and Australia (0.7%) [18], but it is lower than reported prevalence of RA in Mexico (2.8, 1.6%) [23, 35]. Furthermore, reported frequency of RA in the Middle East (0.2–0.5%) and mean prevalence of RA in APLAR countries (0.33%) [36] is lower than that in Western countries [37]. Forms of peri-arthritis (tendonitis, tenosynovitis, and bursitis) were detected in 9.3% of the studied participants which was higher than that reported in COPCORD studies carried out in different areas in Iran [10–14]. It seems that difference in the prevalence of MSD complaints and rheumatic disorders in the COPCORD literature can be attributable to diverse sample size and randomization, genetic/ethnic, cultural, socioeconomic, demographic, psychosomatic, and geographic factors. Our findings are consistent with the previous studies that showed the prevalence of common musculoskeletal disorders increased with age [5, 38, 39] and that women were more affected than men [5, 38–40].

In general, the present findings should be interpreted considering the limitations of the study. The major limitation of the current study was small sample size, especially the minimum number of interviewed patients to be considered as a COPCORD study.

Conclusions

In conclusion, the prevalence of musculoskeletal disorders is very high in northwest of Iran; Therefore, it calls for action by health officials and professionals to plan for appropriate programs of prevention and management of MSDs in society.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standard.

Informed consent Informed consent was obtained from all individual participants included in the study.

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