PREVALENCE OF MUSCULOSKELETAL DISORDERS AMONG MONKS AND NUNS IN EGYPT

By

Marian Magdy Zaky Ebrahim

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SUPERVISORS

Prof. Dr. Mohamed H. El Gendy

Professor of Physical Therapy, Head of Basic Science Department

Faculty of Physical Therapy

Cairo University

Dr. Aida Amir Nassif

Lecturer of Physical Therapy, Basic Science Department

Faculty of Physical Therapy

Cairo University

Chapter 1

Introduction

Musculoskeletal disorders (MSD) is a widespread public health issue that adversely affects a person's functioning, quality of life, and health. It is one of the main reasons people live with disabilities for a long time worldwide. **(Nogueira et al., 2023)**

Monks are those who practice religious asceticism through monastic living, i.e., those who were celibate (not married) and constantly residing in a monastery. They pray for five to ten hours at churches. Orthodox monks work long hours and have little free time while living in monasteries. **(Avdeenko, et al., 2019)**

Radical Christian lifestyle takes the shape of monasticism. It has a title and a structure for Christian life that will direct how homes and communities are built. The monasteries evolved into hubs of Christian activity. They were at the vanguard of mission, academic institutions, private and public places of prayer. sharing financial resources with neighbours and the less fortunate. **(Binns,2021).**

The Coptic monk's day begins at sunrise. After sleeping for the first half of the night, the monk's day officially starts at midnight. starting with the service of the midnight psalmody and accompanying prayer, then continuing with scripture readings till dawn. If the Divine Liturgy is held, he is welcome to attend. He starts working at the specific job that has been given to him and for which he is qualified. Depending on the time of day, he is also expected to be silently praying or participating in other prayers. He then starts one of the numerous tasks at the monastery. **(Sadek, 2012).**

Vivian, (2001) said that " prayer became explicit and more fervent when the monk interrupted his work and stood up, often lifting his arms to heaven after Ving knelt and prostrated himself on the ground. The frequency of this prayer depend on individual and circumstance, so the worship of God in prayer, used to bend his knees a hundred times a night and as many times a day ". Therefore, the monk is always prostrating in his day.

Prostration from a standing to a kneeling position, the exercise is performed by placing the head down and hitting the ground with the forehead, keeping the palms parallel to the ears, and flexing the elbows for a brief period of time. **(Nazish, & Kalra, 2018).**

The primary function of monks and nuns in monastic stories is performing religious duties. After that, they engage in labor-intensive tasks like farming, raising crops, making candles, iconography, and other handicrafts, as well as producing goods that can be sold for use in homes or in churches, such as incense and rosaries. food and drink products made in the monastery. **(Christos , 2017)**

Orthodox Christian lifestyle is beneficial for maintaining mental health, but not for maintaining physical health. Low back pain/sciatica, chronic venous insufficiency (caused by prolonged standing), and periarticular/soft tissue rheumatic illnesses (tendinitis, bursitis/fasciitis, enthesitis, etc.) are the most common diseases.This conclusion is supported by the fact that repetitive physical stress from manual and technical work, along with prolonged standing while praying in church, may trigger the start of the aforementioned health issues. An earlier study that looked at impairment among monks found that the rates of activities of daily living connected to disability were much higher than those of the general population. More frequently than the general population, monks reported a number of chronic illnesses, bodily ailments, and issues with daily tasks. (**Merakou, et al., 2017)**

This study determined the pattern of musculoskeletal disorders among monks and nuns in different monasteries in Egypt .

Statement of the problem

This study aims to answer the following questions :

What is the correlation between monastic years, gender and musculoskeletal disorders?

Hypotheses

This study will be hypothesized that:

1- There is no correlation between years of monastic and musculoskeletal disorders among Egyptian monks.
2- There is no correlation between musculoskeletal disorders and gender of monks and nuns.

Purpose of the study

This study will be conducted to:

1- Survey the relationship between duration of years since ordination and musculoskeletal disorders among Egyptian monks.

2- Survey the relationship between musculoskeletal disorders and gender of monks and nuns.

Significance of the study

The prevalence of musculoskeletal illnesses as a global cause of chronic pain and disability is predicted to rise in the future years. Worldwide, millions of people suffer from the illness known as chronic musculoskeletal pain. It can appear in many areas of the body, such as the back, knees, or shoulders, and be brought on by a variety of things, including ageing, vigorous exercise, bad posture, and trauma. **(Chen, et al.,2023)**

The world health organisation (WHO) estimates that one in three persons worldwide suffer from a musculoskeletal illness that is chronically painful. About 45 million workers in the European Union are affected by musculoskeletal disorder diseases, which are the most common and expensive work-related health issues. **(Gorasso, et al .,2023)**

The prevalence of MSD among Thai monks was discovered to be correlated with older age, longer ordination, and a BMI under 25 kg/m2. **(Whaikit., et al 2020).**

Monks' health in 2016, the fifth most common disease was osteoarthritis **(AL, 2019).** Monks had chronic diseases such as joint pain and arthritis **(Pornprasert., et al 2016)** when considering only low back pain It has a prevalence of 59.3 percent, similar to research in The previous monks who found back pain, waist pain, 53.8%, the prevalence of knee pain was 15.7% less than the previous research in monks. Osteoarthritis of the knee 32.5% **(Suvithanpatthanabandit., et al., 2015),** but in the direction Similarly, the factors related to MSD symptoms of monks as a whole were found that the factors related to MSD Discuss symptoms were age, years of ordination, and death.

the highest prevalence in the lower back (hundred 59.3 percent), followed by shoulders (25.0%), neck (22.5%), and knees (15.8%), respectively, when classified by the

severity of symptoms. past was found to affect daily routines day according to the practice of the monks 11.5 percent and causing them to stop performing their daily activities according to the practice of monks 6.5 percent. **(Whaikit., et al 2020).**

To our knowledge there is lack in the literature regarding MSD among monks and nuns in Egypt.

Delimitations

This study will be delimited to:

1- Sample size will be 400.
2- Age starts from 24 years old and more.
3- Body mass index (BMI) between 18.5 to 24.9 kg/m2
4- Years of ordination
    - (1-3) years "novice" or "probationary".
    - (4-10) years of monasticism.
    - more than 10 years of monasticism.
5- Samples will be selected from several monasteries in Egypt.
6- All data collected by Arabic version of Nordic questionnaire.

Basic assumptions

Subjects will faithfully follow our instructions and answer the questionnaire during participation.

Definition of terms:

Musculoskeletal Disorders (MSDs): are injuries or disorders that affect muscles, nerves, tendons, joints, cartilages, and the spinal discs, that are associated with exposure to risk factors at the work place **(Antwi-Afari., et al ., 2023)**

A **Monk** or **Nun:** are those who practise religious asceticism through monastic living; this refers to celibate individuals who continuously resided in a monastery. (not married) and consumed meals prepared in the monastery**. (Avdeenko.,2019)**

Monastery: building in which monks live and worship. **(Chuchalin., 2023).**

Neck pain: defined as pain in the neck or the cervical region of the body. It is usually common in adults causing morbidity, disability and huge health cost (though not to the extent of LBP) **(Boswell, Trescot, Datta et al., 2007; Côté, Van, Cassidy et al., 2008).**

Nordic questionnaire: the extended Nordic musculoskeletal Q is a reliable instrument that measure the prevalence, severity and impact of musculoskeletal symptoms. **(Rhee H, Miles ms, Halpern CT et al., 2005)**

Chapter 2

Review of literature

This chapter will review the literatures about the following:

1- **Anatomy of Human backbone**
2- **Low back pain**
3- **Neck Pain**
4- **Knee Pain**
5- **Risk factors associated MSDs**
6- **Pathways to developing MSDs**
7- **Association between Age and MSDs**
8- **Association between sex and MSDs**
9- **Association between Work demand and MSDs**
10- **Association between Years of ordination and MSDs**

Anatomy of Human backbone

The human backbone or the vertebral column is made up 33 important group of bones called vertebrae which protect the spine and provide stability to the body. The vertebrae at the neck region are known as the cervical vertebrae and they are made up of 7 vertebrae. The thoracic vertebrae follows the cervical vertebrae and they are made up of 12 vertebrae. The lumbar vertebrae which is made up of 5 vertebrae follows the thoracic vertebrae. The sacrum which is made up of 5 sacral vertebrae fused together also follows the lumbar vertebrae. The vertebral column ends with the coccyx which is made up of 4 coccygeal vertebrae fused together. Each vertebra is separated from the other by a disc which acts as a shock absorber and helps to make the vertebral column flexible. Each vertebra is connected to the other by a ligament. The backbone is surrounded by muscles, blood vessels and nerves. All these structures can be the source of pain. **(klement et al , 2011)**

Low back pain

is experience of an unpleasant sensation and emotional state that can potentially cause tissue damage. **(elwood 2012)**. Pain is the human body's protective mechanism that prevent further damage to an injured part (s) **(yam et al 2018).** Low back pain also known as lumbo-sacral pain affects areas between the 12th rib and the gluteal folds **(Waheed, 2003)**.

It can be grouped based on the duration of the signs and symptoms in to acute, sub-acute and chronic, lasting for 6 week or less, between 6 and 12 weeks, and over 12 weeks respectively. Low back pain can be localized (when it does not radiate into the lower limbs) or referred (when it radiates into the lower limb(s); known as sciatica).

Lower back pain is the most prevalent MSDs and a leading cause of disability amongst workers **(Picavet & Schouten, 2003).** It is also an essential cause of morbidity, early retirement due to ill health, absenteeism, and job changes **(Cunningham, Flynn, & Blake, 2006).**

Studies have reported on the prevalence of lower back pain amongst Thai monks.

For example, **(Whaikit., et al 2020)** reported that 59.3% of Thai monks who developed MSDs had LBP.

Prayer-based exercises effectively affect pain severity and endurance of flexor muscles in patients with non-chronic lower back pain. **(Jokarborzabad., et al .,2021)**

These studies have clearly shown that LBP is the number one MSDs experienced by monk irrespective of the country they find themselves.

Neck Pain

Neck pain defined as pain in the neck or the cervical region of the body. It is usually common in adults causing morbidity, disability and huge health cost (though not to the extent of LBP) **(Boswell, Trescot, Datta et al., 2007; Côté, Van, Cassidy et al., 2008).** Lifetime prevalence has been found to be ranging from 26% to 71% with estimated 12 months prevalence of 30% to 50% **(Boswell et al., 2007; Côté et al., 2008; Peloso et al., 2007).**

Neck pain often arise from structures around the neck such as muscles, vertebral bones, facet joints, ligaments, and capsules etc. **(Cagnie, Danneels,Tiggelen, et al., 2007).**

Injury to soft tissues in the neck region and/or prolonged wear and tear are the main causes of neck pain. The pain may also be referred from the shoulders and upper back. It can rarely be caused by infection (eg. TB) or Cancers **(Ariëns, Van, Bongers et al., 2000; Côté et al., 2008).** Neck pain may be described as specific and non-specific. Specific when the cause can be identified and non-specific (or idiopathic) when it cannot be associated to any specific pathology. Only 10% of neck pains are specific, thus the cause of most neck pain cannot be linked to a specific pathology **(Mayou & Farmer, 2002).**Studies have reported on the prevalence of neck pain amongst Thai monks.

For example, **(Whaikit., et al 2020)** reported that (22.5%) of neck pain in Thai monks.

Knee pain

Prostration From a standing to a kneeling position, the exercise is performed by placing the head down and hitting the ground with the forehead and flexing the elbows for a brief period of time. **(Nazish., & Kalra., 2018).** Some exercise is believed to be beneficial to the joint because it increases the circulation of synovial fluid, which bathes the articular cartilage with nutrients and maintains periarticular muscle strength**..** Repetitive, high-intensity joint impact and torsional loading (twisting) also appear to be associated with joint degeneration. A series of studies that evaluated the longitudinal effects of aging and exercise on OA of the knee and hip after 5 and 8 years of follow-up found no increased risk of developing OA in exercisers, in this case runners, compared with age-similar controls**. (Panush et al., 1995)**

Previous studies have shown Prayer has no effect on knee and hip osteoarthritis, and may be related with hand osteoarthritis. **(Yılmaz, et al., 2008).** Thai Buddhist monk studies shown There was no significant association between the average daily lifetime kneeling in any positions and symptomatic radiographic knee osteoarthritis. **(Tangtrakulwanich, et al 2006)**

Risk factors associated MSDs

Several risk factors have been linked to the development of MSDs in the work environment. These factors include biomechanical, physical, individual susceptibility

and psychosocial conditions **(Barbe & Barr, 2006)**. Physical factors include doing high repetitive movement, maintaining awkward position while working, exposure to high level vibration, and stationary working posture, which elevate the physical loading of joints and surrounding soft tissues (including nerves, muscles, blood vessels) leading to injuries (**Tantawy et al., 2017).**

However, the intensity of the injuries depends on factors such as the frequency, intensity, and duration of the exposure **(Bernard, 1997).** Other physical risk factors such as, prolong sitting, static poor posture, working over the head, excessive work demands on the employee, and poor work control pattern, are associated with upper limb WRMSDs **(Walker-Bone & Cooper, 2005).**

Psychosocial risk factors have also been link to the occurrence of MSDs **(Warren, 2010).** These factors include distress, anxiety and depression **(Magnavita, Elovainio, Nardis et al., 2011; Nahit, Hunt, Dunn, et al., 2003).** Further, when it comes to individual susceptibility, body mass index (BMI) which an indicator of the body's adiposity plays an important role in the development of WRMSDs. Body mass index is body's weight divided by the height squared. People with higher BMI has been found to be more likely to develop MSDs compared to those with lower BMI **(Viester, Verhagen, Hengel, et al., 2008).** Also, high stress level has been found to increase body weight leading to an increase in BMI **(Yang et al., 2014)** and therefore is a risk factor for occurrence of WRMSDs.

Pathways to developing MSDs

The primary pathways to occurrence of MSDs are

- Central nervous system (CNS) recognition of the forceful and repetitive task leading to altered sensation and motor abilities which result in WRMSDs
- Forceful and repetitive task causes tissue injury leading to acute or chronic inflammation depending on the duration. This then leads to tissue fibrosis which finally causes WRMSDs.
- In the third pathway, forceful and repetitive task leads to either pathological remodeling which results in reduced biomechanical tolerance and finally causing

WRMSDs, or adaptive remodeling to compensate for the exertion. **(Barbe & Barr, 2006).** However, it is worth noting that these pathways do not work in isolation but are interconnected and interrelated. **(Grote, 2019)**

Association between Age and MSDs

Several studies have established association between age and development of MSDs. **(Heiden, Weigl, Angerer, et al.2013)** revealed that the frequency of developing MSDs increased significantly with age among nurses in Germany Darragh, Huddleston and King (2009) also reported that age of 55 years and above is significantly associated with the development of WRMSDs among occupational therapist. Further, **(Janwantanakul, Pensri, Jiamjarasrangsri, et al. 2008)** reported that younger workers (<30 years) were more prone to experience WRMSDs of the upper limb compared to

.those older than 49 years. Again, The mean age (SD) of monks was 60.4 (12.7) with knee osteoarthritis Among monks in Songkhla province in the southern part of Thailand. **(Tangtrakulwanich, et al 2006)** In a recent study, age was found to be significantly associated with occurrence WRMSDs in the lower back, neck and upper back (**Yan et al., 2017**). In contrast to all these studies**, (Landau, Rademacher, Meschke, et al., 2008)** reported no significant association between age and development of MSDs and suggested that this could be due to the assignment of certain job task to certain specific workers.

Association between sex and MSDs

Only few studies analyzed the association between sex and MSDs **(Janwantanakul et al., 2008; Darragh et al., 2009;Mohanty, Singh, & Pattnaik, 2017)**. reported that females were more predisposed to developing WRMSDs as compared to their male counter parts. Similarly, reported higher prevalence of MSDs in females as compared to their male counter parts. Females were found to have higher prevalence of MSDs compared to male counter parts by **(Campo et al., 2008). (Yılmaz, et al., 2008) Tantawy et al. (2017)** reported that Age and sex standardized incidence rate of hand

OA is 100/100,000 person-years. Women are affected much more frequently than men, at a ratio of about 10:1. These results can explain by the fact that females general have weaker bodies so they are more predisposed to the development of MSDs.

Association between Work demand and MSDs

Significant association between work demand and development of MSDs has been 0established by several studies. The higher the work demand on the worker, the more likely he or she becomes predisposed to the development of MSDs. **Heiden et al. (2013)** reported that high levels of physical task correlates to higher risk of developing MSDs.

Merakou, et al (2017) showed that monks living in communal monasteries estimate their physical health to be better than the monks who live in skete and Orthodox Christian way of life constitutes a successful pattern of mental health but not for physical health. **Yan et al. (2017)** found that excessive workload and poor postures were the risk factors for the development of MSDs**.**

Association between Years of ordination and MSDs

Monks had a high prevalence of MSD overall. Happens to all parts of the body. The factors that were more associated with MSD symptoms were age, ordination years. **Whaikit, et al (2020).**

Merakou, et al (2017) showed that increased age, living in a skete, increased years in Monasticism, having a physical, mental problem and MSDs. The study of **Rodopaios, N. E., et al (2020)** investigated the possible effects musculoskeletal metabolism, on bone density in monks over 10 years of ordination.

Samerchua, et al (2017) The number of years of ordination can have a significant positive correlation with BMI. So the sedentary lifestyle for a prolonged period of ordination could increase the risk for MSDs. **MR, & Asha, 2020).**

So we can Take into consideration the relationship between Years of ordination and MSDs

Chapter 3

Subjects, Materials and Methods

This study will be conducted at several monasteries in Egypt to make correlation between musculoskeletal disorders and monastic years among monks and nuns.

Study design: Observation study - cross-sectional survey.

Participants: sample size of monks will be 400 subjects of both genders (monks and nuns) randomly selected from different monasteries, Participants aged from 24 years old and above thought monastic years. As:

- (1-3) years "novice" or "probationary"
- (4-10) years of monasticism
- more than 10 years of monasticism

Inclusion criteria:

1- Both genders will include in study.
2- Monks and nuns work in different works administration.
3- Age starts from 24 years old and more. **(Merakou, et al., 2017)**
4- Body mass index (BMI) between 18.5 to 24.9 kg/m2 **(Van, et al., 2023)**

Exclusion criteria:

1- Monk or nun had musculoskeletal abnormalities due to causes (congenital or traumatic).
2- Monk or nun with previous operation involving locomotor system.
3- Outside body mass index range.

instrumentations:

-All data collected by E-mailed Nordic questionnaire which availed, reliable and multiple part questionnaire. (**Salik and Özcan ., (2007)(appendix II)**

The questionnaire had four sections:

- **section A**– collected the Sociodemographic information:

- Age and gender, duration of ordination and type of professional work.

- **section B** –Musculoskeletal disorders resulting from work:
- **section C –** collection information of ergonomic features:
    - weight and height.
    - praying hours in standing position.
    - Working hours in the sitting position or standing position.
    - Others: any activities in daily life of monk.
- **section D** – assess occurrence of musculoskeletal complaints the questionnaire divide back region to cervical, upper back and lower back.

    section D as our study done on upper and lower back includes diagrams clearly marked.

Data Analysis:

The data will be collected from questionnaires which are on answered by monks and nuns who live in different monasteries in Egypt.

Statistical Analysis:

Descriptive statistics of mean and standard deviation, frequencies, percentage and confidence interval (CI) are utilized in presenting the subjects demographic and musculoskeletal disorders data. Person's chi – square statistic and logistic regression is utilized to examine associations between musculoskeletal disorders prevalence and years of ordination. The level of significance for all statistical tests is set at $p<0.05$. All statistical measure will be performed through the statistical package for social studies (SPSS version 22 for windows)

Ethical Considerations:

All participants will sign a consent form to declare that they are not forced to Participate in this study

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APPENDIX I

CONSENT FORM

I am /…… freely and voluntarily consent to this research study

under the direction of the researcher . /

A thorough description of the procedure has been explained to me and I understand

that I can withdraw my consent and discontinue participation in this research at any time

without prejudice to me.

Date…… :

Participant Participant's signature:

Researcher Researcher's signature:

اقرار

أقر أنا (الموقع ادناه) : ..... بأنى اقبل المشاركة فى هذة الدراسة, وقد اطلعت على كافة الجوانب المتعلقة بالدراسة التى تخص المشاركة بها. وتم شرحها لى من قبل الباحثة واجابت عن كل استفساراتى عن الدراسة واعى النتائج والاخطار المتعلقة بمشاركتى فى هذة الدراسة ، اعطى سماحى لاستخدام جميع النتائج من الدراسة فى اى تقرير او ورقة بحثية مع الحفاظ على هويتى وعدم اظهارها،

واعلم اننى استطيع الانسحاب من الدراسة فى اى وقت وبدون اى اجراءات ضدى

وسوف اخبر الباحثة عن انسحابى اذا تم .

التاريخ .....:

اسم المريض توقيع المريض

اسم الباحث توقيع الباحث

APPENDIX II

Nordic Musculoskeletal Questionnaire (NMQ)

الاسم : الطول :

السن : الوزن :

سنوات الرهبنه : النوع : راهب ☐ راهبة ☐

الرجاء الإجابة على جميع الأسئلة التالية:	قم بالإجابة على هذه الفقرة إذا تم الإجابة بنعم على نفس الفقرة في العمود الأول (١)	قم بالإجابة على هذه الفقرة إذا تم الإجابة بنعم على نفس الفقرة في العمود الأول (١)
خلال الاثني عشر شهراً الماضية هل عانيت من مشكلة (الم، تنميل، عدم ارتياح) في الأماكن التالية:	خلال الاثني عشر شهراً الماضية هل مُنعت او تسببت المشاكل السابقة بعدم القدرة على أداء الاعمال الطبيعية (خارج المنزل او داخل المنزل):	خلال السبعة ايام الماضية هل عانيت من مشكلة (الم، تنميل، عدم ارتياح) في التالي:
الرقبة: ☐ لا ☐ نعم	الرقبة: ☐ لا ☐ نعم	الرقبة: ☐ لا ☐ نعم
الكتف: ☐ لا ☐ نعم، المرفق الايمين ☐ نعم، المرفق الايسر ☐ نعم، كلا المرفقين	الكتف: ☐ لا ☐ نعم، المرفق الايمين ☐ نعم، المرفق الايسر ☐ نعم، كلا المرفقين	الكتف: ☐ لا ☐ نعم، المرفق الايمين ☐ نعم، المرفق الايسر ☐ نعم، كلا المرفقين
المرفق: ☐ لا ☐ نعم، المرفق الايمين ☐ نعم، المرفق الايسر ☐ نعم، كلا المرفقين	المرفق: ☐ لا ☐ نعم، المرفق الايمين ☐ نعم، المرفق الايسر ☐ نعم، كلا المرفقين	المرفق: ☐ لا ☐ نعم، المرفق الايمين ☐ نعم، المرفق الايسر ☐ نعم، كلا المرفقين
الرسغ/اليد: ☐ لا ☐ نعم، الرسغ/اليد الايمين ☐ نعم، الرسغ/اليد الايسر ☐ نعم، كلا الرسغين/اليدين	الرسغ/اليد: ☐ لا ☐ نعم، الرسغ/اليد الايمين ☐ نعم، الرسغ/اليد الايسر ☐ نعم، كلا الرسغين/اليدين	الرسغ/اليد: ☐ لا ☐ نعم، الرسغ/اليد الايمين ☐ نعم، الرسغ/اليد الايسر ☐ نعم، كلا الرسغين/اليدين
أعلى الظهر: ☐ نعم ☐ لا	أعلى الظهر: ☐ نعم ☐ لا	اعلى الظهر: ☐ نعم ☐ لا
أسفل الظهر: ☐ نعم ☐ لا	أسفل الظهر: ☐ نعم ☐ لا	أسفل الظهر: ☐ نعم ☐ لا
الورك/ الفخذ: ☐ لا ☐ نعم، الورك/ الفخذ الايمين ☐ نعم، الورك/ الفخذ الايسر ☐ نعم، كلا الوركين/ الفخذين	الورك/ الفخذ: ☐ لا ☐ نعم، الورك/ الفخذ الايمين ☐ نعم، الورك/ الفخذ الايسر ☐ نعم، كلا الوركين/ الفخذين	الورك/ الفخذ: ☐ لا ☐ نعم، الورك/ الفخذ الايمين ☐ نعم، الورك/ الفخذ الايسر ☐ نعم، كلا الوركين/ الفخذين
الركبة: ☐ لا ☐ نعم، الركبة اليمني ☐ نعم، الركبة اليسرى ☐ نعم، كلا الركبتين	الركبة: ☐ لا ☐ نعم، الركبة اليمني ☐ نعم، الركبة اليسرى ☐ نعم، كلا الركبتين	الركبة: ☐ لا ☐ نعم، الركبة اليمني ☐ نعم، الركبة اليسرى ☐ نعم، كلا الركبتين

مدي انتشار الاضطرابات العضلية الهيكلية بين الرهبان والراهبات

في مصر