EXTENDED REPORT

Burden of musculoskeletal disorders in the Eastern Mediterranean Region, 1990–2013: findings from the Global Burden of Disease Study 2013

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ABSTRACT

Objectives We used findings from the Global Burden of Disease Study 2013 to report the burden of musculoskeletal disorders in the Eastern Mediterranean Region (EMR).

Methods The burden of musculoskeletal disorders was calculated for the EMR’s 22 countries between 1990 and 2013. A systematic analysis was performed on mortality and morbidity data to estimate prevalence, death, years of life lost, years lived with disability and disability-adjusted life years (DALYs).

Results For musculoskeletal disorders, the crude DALYs rate per 100 000 increased from 1297.1 (95% uncertainty interval (UI) 924.3–1703.4) in 1990 to 1606.0 (95% UI 1141.2–2130.4) in 2013. During 1990–2013, the total DALYs of musculoskeletal disorders increased by 105.2% in the EMR compared with a 58.0% increase in the rest of the world. The burden of musculoskeletal disorders as a proportion of total DALYs increased from 2.4% (95% UI 1.7–3.0) in 1990 to 4.7% (95% UI 3.6–5.0) in 2013. The range of point prevalence (per 1000) among the EMR countries was 28.2–136.0 for low back pain, 27.3–49.7 for neck pain, 9.7–37.3 for osteoarthritis (OA), 0.6–2.2 for rheumatoid arthritis and 0.1–0.8 for gout.

Conclusions This study shows a high burden of musculoskeletal disorders, with a faster increase in EMR compared with the rest of the world. The reasons for this faster increase need to be explored. Our findings call for incorporating prevention and control programmes that should include improving health data, addressing risk factors, providing evidence-based care and community programmes to increase awareness.
INTRODUCTION
Musculoskeletal disorders have been underestimated and even ignored for a long time, mainly due to their low fatality rate and being viewed as irreversible conditions or simply part of the ageing process. The considerable contribution of musculoskeletal disorders is now more clear and several studies have quantified the burden of musculoskeletal disorders. They valent causes of absence from work and de. High frequency, chronicity and scoliosis disorders impose a considerable burden on the communities. Population ageing and Musculoskeletal disorders increase the burden of musculoskeletal disorders. Despite these facts, it has not been a focus of public health in low-income and middle-income countries. Epidemiological research and musculoskeletal disorders are sparse and not easily comparable in this region come from baseline surveys. The programme, designed by the national League of Associations for 1980s, is presumably the most eminent to tackle the burden of musculoskeletal diseases. Some countries Egypt, Iran, Kuwait, Lebanon, Pakistan and COPCORD projects in the past two decades have shown a high prevalence of musculoskeletal conditions in the region; for example, low back pain had eight sequelae classiﬁed as the most common sites of pain were reported. In the northern part of Pakistan in 1980s had rheumatic diseases with higher prevalence compared with poor urban areas (10.7%). Musculoskeletal disorders were generally more common in males. The overall prevalence of musculoskeletal disorders was calculated: rheumatoid arthritis, osteoarthritis, low back pain, neck pain, gout and other musculoskeletal disorders. In GBD 2013, the burden from six main categories of musculoskeletal disorders was calculated: rheumatoid arthritis, osteoarthritis, low back pain, neck pain, gout and other musculoskeletal disorders. We used the International Statistical Classification of Diseases and Related Health Problems, tenth revision (ICD-10) codes or their equivalent codes in the earlier versions of ICD and assumed different sequelae for each disorder (table 1). Each musculoskeletal disorder had a list of sequelae with potentially different levels of disability; for instance, low back pain had eight sequelae classified as mild, moderate, severe and most severe low back pain with or without leg pain. Range of disability weight for these sequelae was different from 0.02 (95% uncertainty interval (UI) 0.01–

| disorders, equivalent ICD-10 codes and list of sequelae for each disorder in the Global Burden of Disease Study | Sequelea (number of sequelae) |
|---|---|
| M06.9, M08.0-M08.89 | Mild, moderate and severe rheumatoid arthritis (3) |
| M13.9, M15-M19.079 | Mild, moderate, severe and osteoarthritis of the hip (mild, moderate and severe osteoarthritis of the knee (6)) |
| G54.3, G54.4, G57.0-G57.12, M43.2-M43.5, M43.9, M45-M49, M49.89, M51-M51.9, M53, M53.2-M54, M54.1-M54.18, M54.3-M54.9, M99.1-M99.9 | Mild, moderate, severe and most severe low back pain without leg pain (mild, moderate, severe and most severe low back pain with leg pain (8)) |
| , M50-M50.93, M53.0, M53.1, M54.0-M54.09, M54.2 | Mild, moderate, severe and most severe neck pain (4) |
| M10.19, M10.3-M10.9 | Asymptomatic gout, symptomatic episodes of gout and polyarticular gout (3) |
| L93-L93.2, M00-M03.0, M03.2, M03.6, M07-M08, M08.9-M09.0, M09.8, M11-M12, M12.2-M12.49, M12.8-M12.9, M14-M14.89, M25.679, M30-M32.9, M34-M36.8, M40-M43.19, M65-M68.8, M73, M73.8, M75-M77.9, M80-M83.4, M83.8-M87.09, M87.3-M89.59, M95.9, M99.0-M99.9 | Asymptomatic other musculoskeletal disorders and other musculoskeletal disorders severity levels 1–6 (7) |

Classification of Diseases and Related Health Problems, tenth revision.
In this study, the burden is described as prevalence, deaths, due to premature mortality, years lived disability-adjusted life-years (DALYs), age-standardised rates to be able to disperse population structure from the different sex-specific rates. Musculoskeletal disorder categories (except the category of ‘other musculoskeletal’ to be non-fatal with no mortality and sub-mortality. To estimate the cause mortality envelopes (total number of were estimated for each country during 3. All accessible data from vital registry surveys, sample registration data were considered for preparing of death data was extracted from the available verbal autopsies. We semed modelling to estimate the rheumatoid arthritis and ‘other musculoskeletal, sex, country and year, we updated the GBD 2010 systematical measures for each musculoskeletal ent strategies to avoid missing sources of ring of the results of systematic reviews ork of GBD collaborators. A list of ns is available on the Global Health tp://ghdx.healthdata.org/gbd-2013-database-metaregression analyses through sed for disease modelling. We used fixed and country-level covariates to adjust le of study-level covariates, we included OA disease definition as the reference extracted data from other studies that poring having had a diagnosis of OA, of OA regardless of symptoms’ or ‘OA radiographic confirmation’. More details le in the online appendix of a previous sed epidemiological estimates in contemporaries were used to calculate cause-age, sex, location and calendar year. through summation of YLLs and YLDs, able burden of the following risk factors of musculoskeletal disorders: occupa, high body mass index and low glom tails on definitions of these risk factors r musculoskeletal disorders are available previous publication. % UIs for each quantity in this analysis, king 1000 samples of posterior distribution and 975th values of the distribution. to musculoskeletal disorders in EMR 5% UI 1380–2090) in 1990 to 5084 9) in 2013, a 198% increase. rate was 0.89 per 100 000 (95% UI 1.39 per 100 000 (95% UI 1.07–1.58) of deaths in 2013 was equal to 0.83 0 (95% UI 0.62–0.95) and constitutes 0.14% (95% UI 0.10–0.16) of all deaths. YLLs of musculoskeletal disorders increased from 68 211 (95% UI 52 961–86 586) in 1990 to 183 659 (95% UI 131 166–219 907) in 2013, a 169% increase. Web appendix table S1 shows point prevalence of musculoskeletal disorders in the EMR countries. Low back pain was the most common condition in all countries in 2013, except Kuwait and Lebanon where neck pain was more prevalent: the range of point prevalence of low back pain was between 32.45 per 1000 in Kuwait and 159.23 in Egypt. The range of point prevalence of neck pain was between 34.31 per 1000 in Pakistan and >53 per 1000 in Somalia and Djibouti. Osteoarthritis ranged from 29.67 per 1000 in Pakistan to >46 per 1000 in Somalia and Djibouti. Point prevalence of gout had a range of 0.15 per 1000 in Pakistan to 1.00 per 1000 in Iran and Qatar. Point prevalence of rheumatoid arthritis was between 0.88 per 1000 in Saudi Arabia and >3 per 1000 in Somalia and Djibouti (web appendix table 1). YLDs of musculoskeletal disorders increased from 1279 per 100 000 (95% UI 907–1686) in 1990 to 1576 (95% UI 1111–2100) in 2013. Musculoskeletal disorders were the second leading cause of YLDs after ‘mental and substance use disorders’ and accounted for 15.7% of all YLDs (95% UI 13.8–17.7%) in 2013. Low back pain and neck pain had the highest YLDs among the disorders (web appendix 1).

As expected, YLDs were the main component of DALYs for musculoskeletal disorders (>98%, both in 1990 and 2013), and DALY estimates were very close to YLD estimates. The total burden of musculoskeletal disorders was 4 842 603 DALYs (95% UI 3 450 654–6 359 159) in 1990 and increased to 9 946 874 DALYs (95% UI 7 068 174–13 194 791) in 2013, a 105.4% increase in total DALYs of musculoskeletal disorders, compared with a 58.0% increase in the rest of the world. The crude DALYs rate per 100 000 increased from 1297.1 (95% UI 924.3–1703.4) in 1990 to 1606.0 (95% UI 1141.2–2130.4) in 2013, which shows a 23.8% increase. Age-standardised DALY rates were 2055.6 (95% UI 1478.3–2704.1) in 1990 and increased by 2.9% to 2115.9 (95% UI 1517.2–2799.7) in 2013. The burden of musculoskeletal disorders as a proportion of total DALYs has constantly increased since 1990; the proportion that was 2.4% (95% UI 1.7–3.0) in 1990 increased to 3.2% (95% UI 2.8–4.6) in 2000 and 4.7% (95% UI 3.6–5.8) in 2013. Figure 1 compares the burden of musculoskeletal disorders in the EMR to data for the world, low/middle-income countries and high-income countries. Table 2 summarises DALY rates for each musculoskeletal disorder. As shown, DALY rates have been increased during 1990–2013 for all musculoskeletal disorders, both in men and women.

Egypt had the highest and Lebanon had the lowest age-standardised musculoskeletal disorders DALY rates both for males and females. Ranges of age-standardised DALY rates had a considerable overlap between the low-income, middle-income and high-income countries of EMR (table 3). DALY rates had a clear increasing pattern with age; however, those of middle age had the highest number of DALYs (figure 2). Among different musculoskeletal disorders, low back pain had the highest proportion of DALYs in all age groups. The proportion of osteoarthritis DALYs out of total DALYs of musculoskeletal disorders increased with age. In individuals aged ≥65 years, osteoarthritis was the second important cause of DALYs after low back pain.

The burden of musculoskeletal disorders was higher in females compared with males, except for low back pain and gout. The total burden was 5 415 756 DALYs (95% UI 3 877 474–7 150 503) in females and 4 531 118 DALYs (95% UI 3 032 884–5 028 353) in males. The second leading cause of YLDs was mental and substance use disorders, accounting for 15.7% of all YLDs (95% UI 13.8–17.7%) in 2013. Low back pain and neck pain had the highest YLDs among the disorders (web appendix 1).
males in 2013. DALY rates were 1800.9 (95% UI 1289.4–2377.7) and 1422.2 (95% UI 1004.5–1891.6) respectively. Figure 3 shows the burden of disorder by sex in 2013. Gout had a small LYs per 100,000 in women and men, and has not been shown in the figure.

The ratio of age-standardised female to male musculoskeletal DALY rates ranged between 1.02 in Morocco and 2.01 in Iran (table 3). The ratio of age-standardised female to male DALY rates was <1 for gout disease in all countries of the region. For low back pain, the ratio was <1 except for Sudan (1.02), Egypt (1.03), Saudi Arabia (1.15), Lebanon (1.43) and Iran.
Table 3  Age-standardised disability-adjusted life year rates (per 100 000) of musculoskeletal disorders by country and sex in the Eastern Mediterranean Region, 2013

| Countries       | Male Rate | Male 95% UI | Female Rate | Female 95% UI | F/M ratio |
|-----------------|-----------|------------|-------------|--------------|-----------|
| Low-income      |           |            |             |              |           |
| 2125            | 1507–2800 | 1864       | 1293–2500   | 2362         | 1.27      |
| 2075            | 1497–2743 | 1819       | 1280–2456   | 2312         | 1.27      |
| 2020            | 1463–2621 | 1880       | 1350–2473   | 2151         | 1.14      |
| 1998            | 1429–2643 | 1856       | 1307–2448   | 2122         | 1.14      |
| 2848            | 1989–3863 | 2459       | 1692–3335   | 3201         | 1.3       |
| 2370            | 1708–3153 | 2034       | 1442–2715   | 2683         | 1.32      |
| 2352            | 1683–3108 | 2318       | 1650–3123   | 2370         | 1.02      |
| 2222            | 1664–3056 | 1539       | 1084–2026   | 3095         | 2.01      |
| 2274            | 1605–3003 | 2028       | 1418–2718   | 2507         | 1.24      |
| 2195            | 1555–2972 | 1943       | 1318–2692   | 2450         | 1.26      |
| 2177            | 1533–2925 | 1862       | 1209–2593   | 2480         | 1.33      |
| 2040            | 1438–2728 | 1880       | 1289–2590   | 2165         | 1.15      |
| 2007            | 1389–2732 | 1849       | 1240–2579   | 2161         | 1.17      |
| 1992            | 1413–2654 | 1842       | 1307–2450   | 2125         | 1.15      |
| 1636            | 1186–2158 | 1603       | 1156–2140   | 1670         | 1.04      |
| 1287            | 937–1715  | 1093       | 792–1450    | 1500         | 1.37      |
| 2205            | 1598–2914 | 1994       | 1404–2686   | 2505         | 1.26      |
| 2161            | 1528–2852 | 1806       | 1247–2404   | 2650         | 1.47      |
| 2080            | 1470–2782 | 1825       | 1222–2538   | 2436         | 1.33      |
| 2078            | 1485–2764 | 1914       | 1318–2587   | 2499         | 1.31      |
| 2040            | 1463–2688 | 1985       | 1400–2651   | 2151         | 1.08      |
| 1361            | 983–1794  | 1126       | 809–1469    | 1741         | 1.55      |

The proportion of musculoskeletal disorders’ burden over total burden of disease has even increased. Musculoskeletal disorders are the second leading cause of disability in the EMR. Although population ageing is a main reason for increasing burden of musculoskeletal disorders, a large proportion of the burden is imposed on people in their most active and productive years of life. We did not find a specific association between income level of the country and burden of musculoskeletal disorders; however, the relative importance of risk factors (occupational ergonomic factors compared with high body mass index) was different based on the income level of countries.

Our findings call for incorporating prevention and control programmes for musculoskeletal disorders in national health programmes. COPCORD could be used as a stepwise approach to address the high burden of musculoskeletal disorders; however, previous COPCORD programmes in EMR usually have not progressed beyond the early stages (such as baseline surveys) towards a focus on prevention and control activities. Considering the important risk factors of musculoskeletal disorders, public education, occupational health and safety and ergonomics are among the most important components of any prevention and control programme. Medical interventions and rehabilitation to preserve functional status are essential to provide control of the situation.

Advocacy is required to raise the attention of policy and decision makers to the disease burden caused by musculoskeletal disorders. As a reflection on the previous round of the ongoing GBD study, some experts recommended extensive involvement.
to initiate any intervention for control
ders and integrating services with exist-
res. Mody and Brooks suggested new
gies to train community health workers
viders to detect and initiate the man-
rlier stages. People with musculoskeletal conditions
m of services including traditional, com-
ve therapies of which efficacies may not
nt biological medications and surgical
the long-term outcomes of some mus-
ch as rheumatoid arthritis or severe
they can be too expensive to be afford-
ly access to healthcare providers is
f the musculoskeletal disorders. For
with inflammatory disorders such as
rly assessment by a specialist improves
Lebanon, around a quarter of these
nd of treatment. On the other hand,
using unnecessary diagnostic or thera-
people with musculoskeletal symptoms,
er countries. This needs to be avoided
for quaternary prevention.
le factors (such as maintaining physical
, having a balanced diet, avoidance of
h alcohol consumption, and preventing
juries) is not only beneficial for musculoskeletal health but
also for other non-communicable diseases that contribute to
creasing mortality and morbidity.

Low back pain and neck pain have the highest burden of mus-
culoskeletal disorders in most of the EMR countries. In previous
studies, the seven-day period prevalence of pain for dorsolum-
bar and cervical spine in Iran were 23.7% and 14.2%, respect-
ively. The estimates were higher in rural areas compared with
urban areas, and also in people with specific jobs and pregnant
women. In Kuwait, the point prevalence of low back pain in
choolchildren aged 10–18 years old was 20.6% in males and
9.3% in females. A cumulative prevalence of around 28%
for low back pain was reported by children aged 11–19 years
old in Tunisia. Some of these estimates cannot be directly
pared with our estimates due to different definitions and
the time interval used for assessment. However, the available
evidence collectively reflects the importance of the problem.
There are several evidence-based public health and clinical
guidelines for low back pain and neck pain, usually
from high-income countries. Development of suitable guidelines
for use in resource-poor settings is challenging. Most research
evidence originates from high-income countries and may not be
relevant or applicable to the needs of low-income countries.
Moreover, the development of valid clinical guidelines needs
resources and certain expertise that sometimes is not available.
In the paucity of nationally developed guidelines, EMR coun-
tries can use the available guidelines through adaptation
processes.

Osteoarthritis is an important cause of disability, especially in
erly people. It is expected to be influenced by the population
aging process more than other musculoskeletal disorders. Some
evidence suggests that intensive physical activity might increase

[Graph showing disability-adjusted life-years (DALYs) of musculoskeletal disorders in the Eastern Mediterranean]
large joints; however, this is not a

dings on association of physical activity

ecially confusing

in the elderly; while

at walking and physical exercise has a
eoathritis, there are some reviews that

elder individuals can help to reduce

arthritis. Light or moderate physical

known to increase risk or complications

activity can also decrease risk of osteo-
g body mass index. The burden of

disorders' was around threefold in

men. Conditions such as fibromyalgia

disorders are more prevalent among

mitations. Although we estimated a col-
culoskeletal disorders in this study, we

e estimations for some of the disorders

and systemic connective tissue disor-
not separately assess the burden of hand

ification of musculoskeletal disorders

on between symptoms, complaints and

t codes clarify the components of each

clude osteoporosis as a disease; instead,
y was classified as a risk factor for frac-
e burden has not been shown in this

t provide separate estimates for diseases

such as the Behçet disease, which have regional importance in

EMR or individual (but not collective) high burden.

There were issues with availability and quality of data in some

ER countries; however, we used GBD modelling approaches
to reduce this issue. Indeed, the lack of high-quality data in the

region, especially from the 1990s, might have an influence on

the estimated trend of musculoskeletal diseases. Although this

issue exists for many of the causes of diseases, it might have an

imbalance effect on musculoskeletal diseases (the importance

of which has been highlighted in the recent decades) compared

with the other diseases. This factor might affect different regions

of the world in different ways. However, we do not believe that

it can purely explain the faster increase in burden of musculo-
skeletal disorders in EMR compared with the rest of the world.

CONCLUSION

Findings from this study show a high burden of musculoskeletal

disorders, especially low back pain, neck pain and osteoarthritis

in the region. The reasons for faster increase of musculoskeletal

disorders' burden in EMR during 1990–2013 compared with

the rest of the world need to be explored. Our findings call for

integrating prevention and control programmes for musculoskel-
etal disorders with health system programmes. Plans should

include improving health data to monitor trends, addressing

known risk factors especially through health education and

awareness, ergonomics and occupational health and safety, and
providing evidence-based early diagnosis and treatment, rehabilitative care and community programmes to increase knowledge of risk and protective factors.

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Acknowledgements The authors acknowledge Pauline Kim at the Institute for Health Metrics and Evaluation, Seattle, WA, for editing this paper.

Contributors MM-L and AHM prepared the first draft. All other authors provided data, developed models, analysed data, reviewed results, provided guidance on methodology and/or reviewed the manuscript. MM-L and AHM finalised the draft based on comments from other authors’ feedback. MM-L, AHM, AA and MHF responded the comments of reviewers. AHM and CJLM accept full responsibility for the work, have access to the data and controlled the decision to publish.

Funding The global burden of disease study was funded by the Bill and Melinda Gates Foundation.

Competing interests None declared.

Provenance and peer review Not commissioned; externally peer reviewed.

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