



Deposited via The University of Leeds.

White Rose Research Online URL for this paper:

<https://eprints.whiterose.ac.uk/id/eprint/179551/>

Version: Accepted Version

Article:

Tran, G, Fascia, D, Askew, J et al. (2021) The prevalence of glenohumeral joint osteoarthritis in a primary care shoulder pain population referred for radiographs. Rheumatology. ISSN: 1462-0324

<https://doi.org/10.1093/rheumatology/keab867>

Reuse

Items deposited in White Rose Research Online are protected by copyright, with all rights reserved unless indicated otherwise. They may be downloaded and/or printed for private study, or other acts as permitted by national copyright laws. The publisher or other rights holders may allow further reproduction and re-use of the full text version. This is indicated by the licence information on the White Rose Research Online record for the item.

Takedown

If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.

TITLE PAGE

1
2

3 **TITLE:** The prevalence of glenohumeral joint osteoarthritis in a primary care shoulder pain
4 population referred for radiographs

5

6 **AUTHORS:**

7 Gui Tran^{1, 2, 3}

8 Dan Fascia³

9 Joseph Askew³

10 Fran Cabry³

11 Charlie Talbot³

12 David Copas³

13 Philip G Conaghan^{1, 2, 4}

14

15 **AUTHOR AFFILIATIONS**

16 ¹Institute of Rheumatic and Musculoskeletal Medicine, University of Leeds, Leeds, UK

17 ²NIHR Leeds Biomedical Research Centre, University of Leeds, Leeds, UK

18 ³Harrogate and District NHS Foundation Trust, Lancaster Park Road, Harrogate, HG2 7SX

19 ⁴ Arthritis Research UK Centre for Sport, Exercise and Osteoarthritis, Nottingham, UK

20

21 **CORRESPONDING AUTHOR**

22 Gui Tran

23 Harrogate and District NHS Foundation

24 Park Road

1 Harrogate

2 HG2 7SX

3

4 Email: gui.tran@nhs.net

5 Orcid ID 0000-0002-3465-0242

6

7

8

9

1 **Rheumatology key message:**

2 Prevalence of glenohumeral osteoarthritis is high in people with shoulder pain referred for
3 radiographic assessment.

4

5

6 Dear Editor,

7 Glenohumeral joint osteoarthritis (GHJ OA) is characterised by pain, restricted movement and
8 radiographic loss of articular cartilage, subchondral bone changes and loss of joint space. It may be
9 primary or secondary to rotator cuff tears (RC arthropathy). It has a significant impact on quality of
10 life, with significant negative effects on lifestyle and emotional health (1). It also poses a significant
11 economic burden: the number of UK shoulder replacements have increased by almost 300% in 5 years,
12 with 7,294 shoulder replacements in 2019 (2). In the USA, from 2007-2015, procedures for GHJ OA
13 have increased by up to 322% and 66,185 patients were discharged from hospital with a diagnosis of
14 GHJ OA in 2016 (3). In Australia, a recent population-level analysis has found the lifetime risk of
15 shoulder arthroplasty from 2008 to 2017 has increased by 128% in men and 87% in women (4).

16 Despite the large socio-economic burden of GHJ OA, evidence on its prevalence is surprisingly lacking.
17 GHJ OA has been reported as the third most common type of OA, affecting 1 in 3 people over 60 years
18 old (3), although the source of these estimates are unclear.

19 We conducted a 12-month retrospective review of all shoulder radiographs in primary care patients
20 referred to a radiology service with shoulder pain. A minimum inclusion age of 45 years was chosen
21 to reflect the United Kingdom's National Institute of Clinical Excellence pragmatic diagnosis of OA (5).
22 Positive results were recorded in patients who had an X-ray report diagnosing GHJ OA, degenerative
23 changes or osteophytes in the GHJ.

24 Our results are shown in Table 1: 1,376 patients attended for radiographs of their shoulder for
25 shoulder pain in 2019. The mean age was 67.9, and an overall prevalence of radiographically
26 diagnosed GHJ OA was 21.2%. Overall prevalence was 21.4% for females and 21.0% for males. There
27 was no substantial difference between males and females in GHJ OA. GHJ OA prevalence increased
28 with age, with prevalence peaking in the 80-89 age group.

Age (years)	% Total prevalence GHJ OA (n positive/total)	% Female with GHJ OA (n positive/total)	% Male with GHJ OA (n positive/total)
45-49 (n=130)	5.4 (7/130)	6.9 (5/72)	3.4 (2/58)
50-59 (n=416)	9.1 (38/416)	9.3 (22/235)	8.8 (16/181)
60-69 (n=379)	17.7 (67/379)	16.2 (31/191)	19.1 (36/188)
70-79 (n=469)	27.9 (131/469)	27.3 (74/271)	28.8 (57/198)
80-89 (n=316)	37.4 (116/310)	36.0 (71/197)	37.8 (45/119)
90+ (n=66)	27.2 (18/66)	29.2 (14/48)	22.2 (4/18)

29

30 **Table 1. Prevalence of GHJ OA in patients referred for shoulder pain by age and sex**

31 ***GHJ OA: Glenohumeral joint osteoarthritis***

32 We are not aware of previous studies that have published age or gender-based prevalence of
33 radiographically-proven GHJ OA in symptomatic individuals. Oh et al. found an overall prevalence of

1 radiographic GHJ OA to be 16.1% in a South Korean population >65, recruited from a community-
2 based cohort, and results were not stratified by age or gender (6). Our finding that GHJ OA increased
3 with age could reflect RC arthropathy, as the prevalence of RC tears (which lead to RC arthropathy)
4 also increases with age.

5 Although estimates vary depending on whether symptomatic or radiographic OA is reported, our
6 findings contrast with OA in other joints. In studies evaluating the prevalence of symptomatic hip OA
7 in a community-based cohort of 978 patients aged >50 years, age and sex-based prevalence was
8 lower, ranging from 2.7% (aged 60-69) to 7.4% (aged >80), with an overall crude prevalence of 4% (7).
9 A recent study evaluated the age and gender-based prevalence of hand and knee OA in a large English
10 community population aged >50 years (8). The overall prevalence of symptomatic radiographic knee
11 OA was reported to be 17.7% with a slightly increased overall prevalence in females (19.2%) compared
12 to males (16.0%). Prevalence also increased with age, ranging from 11.9% (50-64 years) to 25.1% (75+
13 years). In the same study, the overall prevalence for symptomatic radiographic hand OA was 22.4%
14 and prevalence increased with age, ranging from 18.1% (50-64 years) to 29.7% (75+ years). Overall,
15 symptomatic hand OA was more prevalent in females (28%) than males (16.1%).

16 There are limitations to our findings despite the sample size. Although degenerative changes were
17 reported on radiographs, these may not be the cause of shoulder pain. The severity of pain and patient
18 ethnicity could not be described. Radiographic reporting was not standardised, and we could not
19 evaluate inter-and intra-reader reliability. Classification of radiographic severity would have helped
20 further characterise the sample. This study was undertaken in a single centre. The number of patients
21 presenting with shoulder pain to the primary care referral centres was unknown and our reported
22 radiographic prevalence is likely an over estimate of community-based prevalence of symptomatic
23 shoulders.

24 Our study is the first of its kind to report age and sex-based prevalence of radiographically proven GHJ
25 OA amongst shoulder pain patients over 45 referred from primary care for an X-ray. The prevalence
26 was higher than expected and unlike other sites of OA, there did not appear to be any sex-based
27 difference. Further work is required to substantiate these findings.

28

29 **ACKNOWLEDGEMENTS**

30 We would like to acknowledge the Physiotherapy Department at Harrogate District Hospital.

31 **FUNDING STATEMENTS**

32 This article presents independent research funded by the National Institute for Health Research

33 (NIHR) Leeds Biomedical Research Centre (BRC) and by a Wellcome Institutional Strategic Support

34 Fund Early Career Fellowship (GT). The views expressed are those of the authors and not necessarily

1 those of the NIHR or the Department of Health and Social Care. This study was also part-funded
2 through the Arthritis Research UK Leeds Experimental Osteoarthritis Treatment Centre (20083).

3 **ETHICS**

4 This was an audit and so no ethical data was required
5

6 **DISCLOSURE STATEMENT**

7 The authors have declared no conflicts of interest
8
9
10

11 **References:**

- 12 1. Lo IK, Litchfield RB, Griffin S, Faber K, Patterson SD, Kirkley A. Quality-of-life outcome following
13 hemiarthroplasty or total shoulder arthroplasty in patients with osteoarthritis. A prospective,
14 randomized trial. *J Bone Joint Surg Am.* 2005;87(10):2178-85.
- 15 2. The National Joint Registry Editorial Board. National Joint Registry: 17th Annual Report2020.
- 16 3. American Academy of Orthopaedic Surgeons. Management of Glenohumeral Joint
17 Osteoarthritis Evidence-Based Clinical Practice Guideline2020. Available from: www.aaos.org/gjocpg.
- 18 4. Miura D, Busija L, Page RS, de Steiger R, Lorimer M, Ackerman IN. Lifetime Risk of Primary
19 Shoulder Arthroplasty From 2008 to 2017: A Population-Level Analysis Using National Registry Data.
20 *Arthritis Care & Research.* 2021;73(10):1511-7.
- 21 5. The National Institute for Health and Care Excellence. Osteoarthritis: Care and Management,
22 Clinical Guideline 1772021 [cited 2021. Available from:
23 <https://www.nice.org.uk/guidance/cg177/chapter/1-recommendations>.
- 24 6. Oh JH, Chung SW, Oh CH, Kim SH, Park SJ, Kim KW, et al. The prevalence of shoulder
25 osteoarthritis in the elderly Korean population: association with risk factors and function. *J Shoulder*
26 *Elbow Surg.* 2011;20(5):756-63.
- 27 7. Kim C, Linsenmeyer KD, Vlad SC, Guermazi A, Clancy MM, Niu J, et al. Prevalence of
28 radiographic and symptomatic hip osteoarthritis in an urban United States community: the
29 Framingham osteoarthritis study. *Arthritis Rheumatol.* 2014;66(11):3013-7.
- 30 8. Peat G, Rathod-Mistry T, Paskins Z, Marshall M, Thomas MJ, Menz HB, et al. Relative
31 prevalence and distribution of knee, hand and foot symptomatic osteoarthritis subtypes in an English
32 population. *Musculoskeletal Care.* 2020;18(2):219-24.

33