

**Delphi Consensus of Risk Factors for Development and Progression of Finger Interphalangeal Joint Osteoarthritis**

Karishma Shah <sup>1</sup> \*

James van Santen <sup>1</sup>

Dominic Furniss <sup>1</sup>

<sup>1</sup> Botnar Research Centre, Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences, University of Oxford, UK

**\* Corresponding Author:**

Karishma Shah

Botnar Research Centre, NDORMS, Old Road, Oxford, OX3 7LD

01865 737254

Twitter handle: @KariShah\_

[karishma.shah@ndorms.ox.ac.uk](mailto:karishma.shah@ndorms.ox.ac.uk)

**Twitter handles:** @KariShah\_ @DominicFurniss

**Keywords (4-6):** Finger interphalangeal joint, Osteoarthritis, Development, Progression

**Acknowledgements:**

We would like to thank all participants of the Chingford 1000 Women Study, Professor Nigel Arden, Professor Tim Spector, Dr Deborah Hart, Dr Alan Hakim, Maxine Daniels and Alison Turner for their time and dedication working on the Chingford 1000 Women Study. We would like to thank Antonella Delmestri for are expertise in creating the data capture software. We would like to thank Grey Giddins, Chris Bainbridge, Adam Sierakowski, Nicholas Riley, Barbara Jemec, Alexia Karantana, Charles Pailthorpe, Rupert Eckersley, Anna Barnard, Nanak Sarhadi, Sarah Kettle, Nicholas Sheppard, Joseph Dias for joining the Delphi panels.

31 **Conflicting Interests:** None

32

33 **Funding:** This work was supported by the BSSH Research Fellowship. The Chingford 1000 Women  
34 Study was funded by Arthritis Research UK (Versus Arthritis) and the Oxford NIHR Musculoskeletal  
35 Biomedical Research Unit.

36

37 **Ethical approval:** This study gained ethical approval by the Oxford University Hospitals Joint  
38 Research Office Classification Group.

39 **ABSTRACT**

40 We undertook two Delphi consensus surveys of full members of the BSSH, to identify risk factors for  
41 a) the development and b) the progression of finger interphalangeal joint osteoarthritis. Eighty-five risk  
42 factors were selected from the Chingford 1000 Women Study, with Delphi panel members able to  
43 suggest additional risk factors after the first round of the Delphi. For the Delphi on developmental risk  
44 factors, three rounds were undertaken with three risk factors being identified as important (age, family  
45 history of mother with hand osteoarthritis, direct injury to the joint). For the Delphi on risk factors for  
46 progression, four rounds were undertaken with four risk factors being identified as important (age,  
47 family history of mother with hand osteoarthritis, family history of father with hand osteoarthritis, family  
48 history of brother with hand osteoarthritis). The results suggest risk factors in the literature are not yet  
49 well known amongst experts.

50 **Level of evidence:** Level V

## MAIN TEXT

Dear Sir,

Osteoarthritis (OA) most commonly affects the hand and wrist joints (Zhang W et al., 2009). Despite this, the aetiology of hand and wrist OA is not well understood. OA of different joints are thought to have differing pathologies; for example, base of thumb and finger OA are considered to be the result of separate disease processes (Reginster et al., 2018). For conditions where evidence remains lacking, a Delphi study has been recommended (Johnson et al., 2019). A Delphi relies on an expert panel to undertake multiple rounds of questionnaires, until consensus is reached. As part of a larger study, we used the Delphi process to identify which risk factors consultant hand surgeons felt were important in a) the development, and b) the progression of finger interphalangeal joint (IPJ) OA.

Panel members were recruited via email between a two-week period (17-31<sup>st</sup> January 2019) from the British Society of Surgery of the Hand registry of full members (420 members). Those whom responded were randomly allocated to either the 'Development Delphi' (Delphi to identify risk factors important for the development of IPJ OA) or the 'Progression Delphi' (Delphi to identify risk factors important for the progression of IPJ OA), with their identity and results kept anonymous throughout. Potential risk factors were identified from the Chingford 1000 Women Study. Six hundred and ninety-four variables exist in the Chingford database at baseline, and these were categorised into 85 risk factors. To allow for additional risk factors to be introduced to the Delphi study, panellists were asked "Are there any other risk factors you would like to suggest?" in Round 1 only, and these suggestions were included in Round 2 and onwards as appropriate. Each round was developed online using REDCap software, with a link emailed to panellists, who had access for 14 days. Panellists were asked to rate the importance of each risk factor on a 5-point Likert scale, with answer options ranging from 'No importance' (score of 1) to 'Extreme importance' (score of 5). Consensus criteria were defined a priori (Table 1). Data was analysed after each round and presented to panellists, allowing them to consider equivocal results in subsequent rounds. A 'classic' Delphi approach was therefore taken in this study (Johnson et al., 2019).

Eighteen surgeons joined the panel, and consented for their answers to be collected, used and stored. Four 'Development' and five 'Progression' panellists completed the full Delphi processes.

### **'Development Delphi'**

After Round 1, no risk factors met inclusion criteria; the panel were unsure about 36 risk factors, 49 met exclusion criteria, and one additional risk factor was suggested by the panel ("direct injury to the joint"). Therefore, 37 risk factors proceeded to Round 2, after which two risk factors met inclusion criteria; the panel were unsure about one risk factor, and 34 risk factors met exclusion criteria, including ten which showed inter-round stability of non-consensus (Holey et al., 2007). The risk factor which the panel were unsure about in Round 2 proceeded to Round 3 and this subsequently met inclusion criteria. Overall, three risk factors met inclusion criteria: age, family history of mother with hand OA, and direct injury to the joint.

### **'Progression Delphi'**

After Round 1, one risk factor met inclusion criteria; the panel were unsure about 16 risk factors, 68 risk factors met exclusion criteria, and three additional risk factors were suggested ("previous ligamentous injury to IPJs", "previous finger fractures", and "previous radiation to hands- e.g. for Dupuytren's"). Therefore, 19 risk factors proceeded to Round 2. After Round 2, two risk factors met the inclusion criteria; the panel were unsure about four risk factors, and 13 risk factors met exclusion criteria, including ten which showed inter-round stability of non-consensus (Holey et al., 2007). Four risk factors proceeded to Round 3 and one subsequently met the inclusion criteria; the panel were unsure about one risk factor, and two risk factors showed inter-round stability of non-consensus and were excluded (Holey et al., 2007). The final risk factor was assessed in Round 4 and was excluded after this round. Overall, four risk factors met inclusion criteria: age, and a family history of hand OA in mother, brother and father.

Our Delphi studies show that expert consensus can be reached to identify putative risk factors for IPJ OA. However, the number of risk factors identified were low, and often required multiple Delphi rounds to produce meaningful results. It also suggested that the established risk factors are not well appreciated within the hand surgery community. Study limitations include the small percentage of

110 hand surgeons who responded, despite the initial invitation of 420 members. However, the panels are  
111 a heterogeneous group of orthopaedic and plastic surgeons from across the UK, with various  
112 academic experience. Further research is important to identify novel risk factors and their interactions  
113 and to also disseminate this knowledge to surgeons.

114 **Table 1: Criteria for consensus for inclusion, consensus for exclusion, and non-consensus**

Criteria:	Definition:	Implication:
Threshold for consensus that variable <b>is</b> an important risk factor (Consensus for inclusion):	≥80% of panellists give a score of ≥4 OR- Median score of ≥4 in two consecutive rounds	Variable does not proceed to the next round
Threshold for consensus that variable <b>is not</b> an important risk factor (Consensus for exclusion):	≥50% of panellists give a score of ≤2 <sup>1</sup> OR- Median score of ≤2 in two consecutive rounds	Variable does not proceed to the next round
Threshold for non-consensus:	Median score of 3 in two consecutive round (ie- remains stable) OR- Median score decreases in one round compared to the previous round	Variable does not proceed to the next round: Consensus for exclusion (Inter-round stability of non-consensus; Holey et al., 2007)
	Median score increases in one round compared to the previous round	Variable proceeds to the next round

115 <sup>1</sup> Ward et al. 2014. Establishing key components of yoga interventions for musculoskeletal conditions: a Delphi survey. BMC Complementary and Alternative  
116 Medicine. 14:196  
117

118

119 **REFERENCES**

120 Holey EA, Feeley JL, Dixon J. An exploration of the use of simple statistics to measure

121 consensus and stability in Delphi studies. BMC Med Res Methodology. 2007,7: 52

122 Johnson N, Leighton P, Dias J. The use of the Delphi method for hand surgery research. J

123 Hand Surg Eur. 2019, Epub ahead of print.

124 Reginster JL, Arden NK, Haugen IK et al. Guidelines for the conduct of pharmacological

125 clinical trials in hand osteoarthritis: Consensus of a Working Group of the European Society

126 on Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal

127 Diseases (ESCEO). Semin Arthritis Rheum. 2018, 48(1):1-8.

128 Zhang W, Doherty M, Leeb BF et al. EULAR evidence-based recommendations for the

129 diagnosis of hand osteoarthritis: report of a task force of ESCISIT. Ann Rheum Dis. 2009,

130 68:8-17.