

How Do Lay People Identify Knee Swelling and What Would They Do About It: Survey Results in the Context of an Event on the Topic of Knee Osteoarthritis

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Abstract

Objective: Besides pain, joint stiffness and muscle weakness, swelling is a common symptom of knee osteoarthritis. According to the literature, there are clinical tests such as the bulge sign or circumference measurement as part of the clinical examination to identify knee swelling. Pharmacological interventions, knee bandages, temporary sports bans and physical interventions are effective decongestant measures. In the conservative treatment of knee osteoarthritis, the promotion of self-management principles is crucial. However, the general population's level of knowledge regarding the identification and treatment of knee swelling is unknown. To get directly in contact with lay people, a crowdsourcing approach is appropriate. Consequentially, the aim of our crowdsourcing-based study is to get an inside of how lay people identify knee swelling and which measures they would adopt.

Methods: Under the assumption that crowdsourcing-based methods can further develop conservative osteoarthritis treatment- in our case especially in the context of knee swelling-, a cross-sectional survey on knee swelling in osteoarthritis was carried out as part of a lecture including a workshop organised in a rural Austrian community. The 26 participants answered two open questions about characteristics and decongestant measures of knee swelling. A content structuring qualitative content analysis with a combined deductive and inductive approach followed by a frequency analysis was used to evaluate the data.

Results: The participants determine knee swelling primarily based on at least one of the cardinal symptoms of inflammation (f=26), as well as an undefined optical increase in circumference (f=9). Physical (f=24), pharmacological (f=14) and complementary interventions (f=16) with partly unclear evidence are mentioned as decongestant measures.

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Conclusion: Identifying knee swelling and applying appropriate decongestant measures challenges lay people. Due to the deficits found, the chosen research method considering a continuous participation of lay people has the potential to further develop and possibly improve outcomes of existing conservative osteoarthritis care programs.

Keywords: Swelling; Osteoarthritis; Treatment; Self-management; Physical examination; Diagnosis; Crowdsourcing.

Introduction

The main knee osteoarthrosis symptoms are pain, joint stiffness, and subsequently joint dysfunction, deformity, and muscle weakness [1]. Among the symptoms, swelling is a common one that negatively affects the knee joint mechanics and the patient's muscle activity [2]. The clinical sign mentioned in this context is the patellar tap [3,4]. Clinical tests such as the bulge sign and the modified stroke test appear to be appropriate and can be combined with the inspection and circumference measurement as part of the clinical examination to identify knee swelling [5]. Currently valid German S1 and S2K guidelines additionally refer to event-related imaging and instrumental diagnostics such as sonography [4,6]. According to the authors' research, descriptions of associated symptoms of joint swelling from the perspective of those affected can be found in summarised form in the secondary literature. Descriptions such as deep, pulling pain, a palpable warming when touched, stiffness and a change in normal function are mentioned [7].

Pharmacological interventions (such as NSAIDs and cortisone), knee bandages, temporary sports bans [4,8] and additionally physical interventions are listed as decongestant measures [9]. The promotion and awareness of self-management principles

is recommended for the conservative treatment of osteoarthrosis [10].

Besides the facts that swelling is a common knee osteoarthritis symptom that changes mechanics and muscle activity, as well as the importance of self-management in the conservative treatment of osteoarthritis, lay people's state of knowledge about the identification of knee swelling and decongestant measures is unclear. To find this out and with the intention to develop a target group specific educational measure for the implementation in the conservative care of osteoarthritis patients in mind, a crowdsourcing approach appears to be suitable.

The methodological approach of crowdsourcing includes closely related methods from the field of Citizen Science and is to be understood as participatory and transdisciplinary [11]. Answers to selected questions and solutions are developed together with the potential target groups. Not every target group can draw on the same skills and experience. Here, the use of technical-digital methods and the target group's accessibility must be considered. Therefore, questionnaires and analogue workshops are also used to integrate the needs and expertise of the crowd [11,12]. Following the argumentation, the aim of this crowdsourcing-based study is to gain an

insight on how lay-people in a rural Austrian region identify and treat knee joint swelling.

Methods

Consultation with the ethics committee of the Province of Carinthia has yielded that there are no ethical concerns about the planned project and no official formal consent of the ethics committee was necessary. Thus, the project plan could be implemented as planned.

Crowdsourcing using a paper-pencil questionnaire was identified as a suitable methodological research approach. To get in touch with the crowd, a free lecture in combination with a workshop on the topic of knee osteoarthritis was organised in a rural Austrian municipality. The event was open to all interested parties and took place on the 24th of June 2022. The invitation was sent via the municipality, regional associations, and health care providers at district level. During the presentation, the crowd was first introduced to the definition and pathophysiology of knee osteoarthritis. Afterwards, the participants voluntarily filled out the questionnaire after they had given their written consent to participate in the survey. They were asked to imagine that they suffered from knee osteoarthritis and to answer the following two open-ended questions on the leading symptom of swelling, in order to do justice to the exploratory character of the survey and to allow multiple answers:

- “How would you know if your knee is swollen?”
- “What would you do against the swelling?”

The lecture continued with a focus on typical symptoms, therapeutic options, as well as the presentation of already established conservative osteoarthritis management programmes. It ended with a workshop in which examples of strengthening exercises were worked out together.

The collected data were first categorised using content structuring qualitative content analysis. That means systematically analysing participant's answers regarding the content and classifying equal answers into a category. The complete participants' answer to the corresponding question was defined as the evaluation unit as well as the context unit. Individual words were determined as the coding unit. An inductive approach was chosen to create the categories regarding the question about swelling determinants. A deductive-inductive approach was chosen regarding the question about decongestant measures [13,14]. According to the literature, pharmacological measures, knee bandages, temporary sports bans [4,8] and physical interventions [9] were used to deductively categorise the data regarding decongestive measures. Subsequently, further (sub-) categories were inductively created. For example, “curd compresses” were coded as physical interventions regarding the deductive categories and further as external curd applications concerning the inductive categories. The categorisation was followed by a frequency analysis of the data.

Results

Twenty-six participants (21 women and 5 men) aged between 33 and 86 years ($M=61.46$, $SD=12.68$) took part in the survey. The

question on how participants would recognise knee joint swelling was answered by 19 participants. (Note: Due to the possibility of multiple answers to open questions and the content analysis described above, frequencies exceeding the number of participants is possible in the subsequent frequency analysis of the data). They mainly referred to the cardinal symptoms of inflammation (f=26). The most frequently mentioned symptoms were limited function (f=8), followed by pain (f=7), overheating (f=5), swelling (f=4) and redness (f=2). In addition, one participant stated the laboratory diagnostic determination of inflammation parameters. Furthermore, an unspecified increase in visual circumference (f=9) was mentioned as a characteristic of swelling. The question about decongestant measures was answered by 25 participants.

As suitable decongestant measures, physical interventions (f=24) were mentioned most frequently in relation to the deductively determined categories, followed by pharmacological measures (f=14). Knee bandages were only mentioned once, while temporary sports bans were not considered by the participants. Other decongestant interventions mentioned that could not be associated with the deductively determined categories included exercise (f=8), general therapies (f=4), nutritional adaptation (f=2) and homeopathy (f=2). Physical interventions could be further subcategorized into external curd applications (f=12), unspecified cryotherapies (f=7) and compresses (f=3), as well as external vinegar applications (f=2). The inductive subcategorization of pharmacological interventions was into topical (f=12) and oral (f=2) medications.

Discussion

A survey conducted during an event on the topic of knee osteoarthritis in a rural region of Austria showed that most participants referred to at least one of the cardinal symptoms of inflammation regarding the characteristics of knee joint swelling. In addition, visual circumferential increases were mentioned. Physical interventions were most cited as reducing swelling, followed by topical and oral pharmacological interventions, exercise, general therapies, nutritional adaptation, homeopathy, and knee braces. When looking at physical interventions in a more differentiated way, mainly curd applications and cryotherapies not described in detail, as well as compresses and external vinegar applications were mentioned. Reflecting on our own methodology, the terms crowdsourcing and citizen science should be taken up first. The latter generally refers to the active participation of the public in scientific research tasks [15]. From the perspective of a citizen science approach, crowdsourcing should focus on the needs of the population. About a specific target group, their needs and interests in the subject area must also be anticipated [11]. This is the case from the authors' point of view. Regarding to the design of the lecture and the time of data collection, care was taken to ensure that the survey took place before any information relevant to the answers was given. Firstly, using vignettes was intended to ensure that it was possible for all persons participating in the lecture to answer, regardless of their experience with osteoarthritis. Secondly, the specific questions were created with the "crowd" in mind. Although the first question

focused on characteristics of swelling from the authors' point of view, the results' interpretative analysis shows clear feedback that can be assigned to the five cardinal symptoms of inflammation and would thus coincide with the associated symptoms of swelling based on secondary literature [7].

From the author's point of view, it remains open whether the participants equate swelling with inflammation or whether they already have different prior knowledge on the topic of osteoarthritis. Latter seems likely due to the time delay in conveying the relevant knowledge in the lecture and the survey. In addition, the total of seven missing answers suggests that lay people have problems naming the characteristics of knee joint swelling. Again, the decongestant interventions reported indicate different prior knowledge. It should be noted that for the physical and homeopathic interventions expressed in our results regarding their decongestant effect, at the current time either contradictory or no research results are available [16-18]. To develop customised educational interventions to promote swelling self-management in osteoarthritis patients for the defined target group by means of a crowdsourcing approach, a flowchart was used in the planning phase, which represents the necessary processes in an idealised way. So far, all the necessary essential project steps have been implemented. These are agreement on the topic, the defined objective about crowdsourcing, the definition of the suitable target group, the determination of the relevance for target groups, the consideration of the understanding and possibilities of the target groups, the definition of the questions,

the clarification of requirements for the crowd, the development of the questions and the planning and implementation of the further procedure [11]. The limiting factors are the small sample size and the presumed different extents of the respondents' swelling experience.

Conclusion

The chosen methodological approach provided first insights into the topic of swelling in knee joint osteoarthritis of a cross-section of the rural Austrian population. This allows us to conclude that there are deficits in terms of swelling recognition and care. Specifically, the description and evidence-based treatment of swelling pose problems for lay people. A continuation of the outstanding steps in the crowdsourcing process is necessary and mainly concerns the feedback of the results to the crowd, a writing or visualization of the derived crowdsourcing concept, an internal and external cross-checking of the results with subsequent concept finalization and final implementation [11]. In general, the chosen crowdsourcing approach can broaden and enrich the spectrum of traditional science [15]. Additionally, the engagement of citizen scientists has the potential to deepen and extend the evidence-based decision-making process [19]. This might also be important for the continued development of Evidence Based Medicine. All involved individuals and professions within Evidence Based Medicine [20] could be involved in the crowdsourcing process. Specifically, it might be interesting to find out how physiotherapists and radiology technologists assess and treat knee joint swelling.

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