



The Success of 'e-knee school' for Knee Osteoarthritis During COVID 19; a Game- Changing Modality for the Future

Meenakshi Sharma¹ · M. S. Dhillon² · Amarjeet Singh¹ · Bibek Adhya³ · Archit Chalana³ · Sandeep Negi³

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Knee School (KS) for patients suffering from Knee Osteoarthritis (KOA) was established as a multidisciplinary endeavour in the outpatient department of our hospital, PGIMER India, in November 2019 (CTRI/2020/03/024311). The patient registration went quite well, and the response to the initiative was good, with the concept evolving well with excellent patient feedback. This involved collecting a group of patients for collective counselling and exercises, after individual data collection and informed consent. However, on 11th March 2020, the World Health Organization evaluated the escalation of new COVID19 cases and declared it as a pandemic [1]. On 24 March 2020, the Government of India ordered a nationwide lockdown for 21 days after a 14-h voluntary public curfew on 22nd March, to reduce contact by social distancing [1]. Since the altered social interactions lead to drastic modifications in health care delivery, the activities of the KS were initially suspended for two weeks. During this period, KOA patients sent in individual requests to resume KS; since this was not physically possible, and virtual delivery of medicine was being propagated, the strategy was changed from 'in-person' KS to the concept of a virtual Knee School (eKS). A small pilot project involving the healthcare workers showed that remote management of KOA using web-based applications was practically applicable, and the virtual model of eKS was initiated on 7th April 2020, taking only KOA patients who had been previously pre-registered during physical KS. Out of 75 pre-registered KOA patients, 25 were found to be eligible; the inclusion criteria were age between 40–65 years of either gender [2],

with mild and moderate KOA (Kellgren Lawrence grade 2,3), showing willingness to participate in the study in a virtual mode, and ability to comply with the planned follow-up schedule.

Basic infrastructure involved a high-speed internet bandwidth, a smart phone or laptop computer and the ability to use the same on a video sharing platform. The initial patient data documentation was done individually, maintaining patient confidentiality. Twenty five eligible patients previously recruited during the KS pilot phase, were invited through WhatsApp messages to join in a shared virtual platform (Zoom/You Tube channel) for a modified protocol of KS, with discussion and exercises, which included stretching, strengthening, warm-up, and cool down. The protocol involved standing quadriceps stretch, supine hamstring stretch, short arc lift, isometric quadriceps exercise, isometric quadriceps with medial rotation of the hip, quadriceps isometrics in sitting position, hamstring isometric, hip abduction, all supervised by the principal author and a senior physiotherapist (Fig. 1) from the hospital. The general precautions were explained, family assisted training was encouraged, and yoga (laughter yoga), dietary management, lifestyle modifications, meditation, weight counselling and experience sharing session among participants were done on the shared platform. Individual patient education, specific dos and don'ts, queries addressal and individual data collation were done on a one to one basis. Eighteen of 25 patients contacted by us consented to join the eKS sessions. Norms of declaration of Helsinki were followed. An informed consent for sharing session with other patients and recording for repeat watch was taken.

Weekly online sessions were conducted for one month (April–May 2020). A link for interactive sessions/live sessions of video conferencing software app was shared through WhatsApp group. All participants were informed about the session in English and native languages (Hindi and Punjabi) one day before the session, and reminded in the morning also. Interactive sessions were held for addressing the

✉ M. S. Dhillon
drdhillon@gmail.com

¹ Department of Community Medicine and School of Public Health, PGIMER, Chandigarh, India

² Department of Orthopaedics and Physical Rehabilitation and Medicine, PGIMER, Chandigarh, India

³ Department of Physical Rehabilitation and Medicine, PGIMER, Chandigarh, India



Fig. 1 Session by physiotherapist

queries by the concerned specialist. Links to the session on Do's and Don'ts recommended by an Orthopaedic surgeon were shared with the participants. KOA patients were encouraged to involve family members in the virtual sessions. Patients were individually advised on telephone about surrogate “remote” data, i.e., how to record self-reported pain on Visual Analogue Scale (VAS) and maintain logbooks which would be checked by personal interaction later. A total of 11 sessions were conducted viz., 1 for testing and orientation of the video conferencing software app, 4 for physiotherapy, 1 for Yoga, 2 for Meditation, and 1 each for Query addressal, Nutrition counselling and outcome feedback. Each session lasted for approximately 30–45 min, at the end of which feedback was obtained from these patients jointly, and individually. The average satisfaction score reported by KOA patients was 5.8 on 6-point Likert scale (1: highly dissatisfied to 6: highly satisfied) for eKS.

With drastic changes in health care delivery due to the COVID crisis, some suggestions in the literature on internet-based interventions to improve health status have met with high acceptance and high user satisfaction [3, 4]; our preliminary experience in KOA patients showed that eKS is a viable option that could reduce costs and logistics issues of both patients and doctors during these difficult COVID19 times. eKS provided a way to remotely deliver non-pharmacological interventions (NPIs), disease education and monitoring via real-time online platforms with audio/video settings for KOA patients, while maintaining patient confidentiality. The only difficulty faced during eKS was an assessment of outcome variables, particularly performance-based tests. We attempted to overcome by recording surrogate “remote” data, i.e., VAS and logbooks, but this will probably need to be correlated with in-person performance-based tests, which we plan at 6 months follow-up. KS concept was also first of its kind, established in the OPD settings of PGIMER Chandigarh, since 2019. eKS, also one of its kind, was established during COVID19 as a virtual extension of the same model. A preliminary literature search revealed only two published protocols on establishing telemedicine for KOA

management, one in China [5] and another in US [6]. A review in 2013 had been conducted on the applicability of the internet for self-management of OA [3], but it took the COVID crisis to convert this thought process into reality. Our preliminary data on the management of KOA through web-based modalities emphasizes the same concepts of patient-as-person, family assisted protocols, with socially interactive approach. The virtual mode makes this aspect of patient more family-centred, as it is done at home, and keeping the same level of socially interactive care delivery as the physical KS provides.

The concept of virtual fracture clinics has been evolving over some time [7]; these have been shown to be safe, cost effective and efficient due to the enhanced web-based telemedicine facilities that are possible today. The applications of the same concepts to an eKS model seem encouraging, even prompting us to explore further its role in the recruitment of new cases, and expanding its applicability. eKS has definitely minimized the disruption of the ongoing KS during the COVID 19 pandemic, as the protocols needed to run the eKS virtually are almost similar to the physical mode. Nevertheless, pitfalls in running virtual clinics need to be noted [8], which will help improve all aspects of web-based medical communications in the future.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical standard statement This article does not contain any studies with human or animal subjects performed by the any of the authors.

Informed consent For this type of study informed consent is not required.

References

1. WHO Director-General's opening remarks at the media briefing on COVID-19 – 11-March 2020 [Internet]. Available from: <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020> Accessed 2020 Jun 14
2. Sharma, M., Singh, A., Dhillon, M. S., & Kaur, S. (2018). Comparative impact of nonpharmacological interventions on pain of knee osteoarthritis patients reporting at a tertiary care institution: a randomized controlled trial. *Indian J Palliat Care*, 24(4), 478–485.
3. Pietrzak, E., Cotea, C., Pullman, S., & Nasveld, P. (2013). Self-management and rehabilitation in osteoarthritis: Is there a place

- for internet-based interventions? *Telemed e-Health*, 19(10), 800–805.
4. Greenhalgh, T., Vijayaraghavan, S., Wherton, J., et al. (2016). Virtual online consultations: advantages and limitations (VOCAL) study. *Br Med J Open*, 6(1), e009388.
 5. Huang, Z., Pan, X., Deng, W., Huang, Z., Huang, Y., Huang, X., et al. (2018). Implementation of telemedicine for knee osteoarthritis: study protocol for a randomized controlled trial. *Trials*, 19(1), 1–8.
 6. Allen, K. D., Bongiorni, D., Caves, K., Coffman, C. J., Floegel, T. A., Greysen, H. M., et al. (2019). STepped exercise program for patients with knee OsteoArthritis (STEP-KOA): protocol for a randomized controlled trial. *BMC Musculoskelet Disord*, 20(1), 1–13.
 7. Iyengar, K., Vaish, A., Toh, E., & Vaishya, R. (2020). COVID-19 and remote consulting strategies in managing trauma and orthopaedics. *Postgraduate Medical Journal*, 96(1137), 438–439. <https://doi.org/10.1136/postgradmedj-2020-137917>.
 8. Iyengar, K., Jain, V. K., & Vaishya, R. (2020). Pitfalls in telemedicine consultations in the era of COVID 19 and how to avoid them. *Diabetes Metab Syndr*, 14(5), 797–799. <https://doi.org/10.1016/j.dsx.2020.06.007>.