

Demographic profile of patients seeking teleophthalmology consultations through e-Sanjeevani: Retrospective analysis of 5138 patients from North India

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Purpose: To report the demographic profile of patients registered through e-Sanjeevani OPD seeking teleophthalmology services. **Methods:** This was a cross-sectional data analysis of patients with ocular complaints registered through the e-Sanjeevani platform at a tertiary care center. It was a doctor-to-doctor consultation, where teleophthalmology consultants provided teleconsultation services at subcenters (SCs), primary health centers (PHCs), and community health centers (CHCs). Data regarding the patient's age, gender, residential address, provisional diagnosis, and treatment prescribed were recorded from May 2021 to February 2022 (9 months). **Results:** In total, 5138 patients were teleconsulted from the mean age of the patients was 37.64 ± 19.34 years. Among these patients, 44% were males and 56% were females. Most of the teleconsultation calls were made from Palwal district (19.8%), followed by Hisar (14.5%) and Sonipat. The most common provisional diagnosis was dry eyes (21%), followed by allergic conjunctivitis (18%), refractive error (15%), and cataract (14%). These constituted approximately 70% of the diagnosis made through teleconsultations. The rest of the eye problems were diagnosed as stye, blepharitis, nasolacrimal duct obstruction, pterygium, subconjunctival hemorrhage, etc., The majority of the patients were managed medically (56.6%) and approximately 11.6% of the patients were referred for surgical intervention. **Conclusion:** e-Sanjeevani is an effective way to provide teleconsultations to patients in remote locations. The majority of the patients seeking ophthalmology consultations can be managed conservatively. Patients requiring surgical intervention can be referred timely, thus avoiding any delay in treatment.

Key words: e-Sanjeevani, hub and spoke model, national health mission, telemedicine, teleophthalmology

Health care services in developing countries usually face issues such as inadequate access, lack of medical human resources, lack of organized continuum of care, and financial constraints.^[1] These challenges posed a major challenge to the health care system of our country during the COVID-19 pandemic. It was during this time that the government of India launched e-Sanjeevani, an online teleconsultation platform. e-Sanjeevani aims to provide teleconsultations to 1.5 lakh health and wellness centers (HCWs) across the nation.^[2] The introduction of e-Sanjeevani has allowed trained doctors to provide medical care outside the traditional face-to-face, in-person medical encounter. e-Sanjeevani is an interactive audiovisual application with the option of a chat box. Our study retrospectively looked at the demographic profile of patients who sought teleophthalmology consultations through the e-Sanjeevani platform.

Methods

This was a cross-sectional study to assess the demographic profile of patients seeking teleophthalmology consultations

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Received: 26-Mar-2022

Revision: 18-Jun-2022

Accepted: 17-Aug-2022

Published: 30-Nov-2022

through the e-Sanjeevani platform. The study was conducted as per the tenants of Helsinki. Ethical clearance was obtained from Institutional Ethics Committee, PGIMER, Chandigarh (INT/IEC/2020/SPL-817). Demographic data of patients seeking teleophthalmology services from May 2021 to February 2022 through e-Sanjeevani at our tertiary care hospital were collected retrospectively.

e-Sanjeevani

The e-Sanjeevani platform was initiated in August 2020 under National Health Mission (NHM) as a part of the "Digital India" initiative.^[3] e-Sanjeevani works on the hub and spoke model, where larger governmental and medical college hospitals in states act as "hubs" and several SCs and PHCs in the periphery act as "spokes." Doctors at various hubs provide telemedicine services to community health officers (CHO) present at peripheral centers. The e-Sanjeevani platform provides doctor-to-doctor (e-Sanjeevani) and doctor-to-patient (e-Sanjeevani OPD) consultations.

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Cite this article as: Markan A, Kishore A, Agarwal A, Akella M, Singh A, Goyal S, *et al.* Demographic profile of patients seeking teleophthalmology consultations through e-Sanjeevani: Retrospective analysis of 5138 patients from North India. *Indian J Ophthalmol* 2022;70:4238-43.

Access this article online

Website:

www.ijo.in

DOI:

10.4103/ijo.IJO_781_22

Quick Response Code:



e-Sanjeevani application has a doctor’s dashboard where all the details of the teleconsultations made by the doctor can be viewed. Details regarding the number of consultations made, pending calls, and duration of video conferencing completed are displayed [Fig. 1]. e-Sanjeevani at our tertiary care hospital provides doctor-to-doctor consultations at various SCs, PHCs, and CHCs in various districts of state of HARYANA. e-Sanjeevani is very user-friendly software, wherein CHOs can register a patient, mention about patient’s chief complaints, upload external photographs of the eye, and can even make a video call or use a chat box to contact the doctor sitting at the hub center. After a thorough evaluation of the patient’s complaints and assessing their reports and photographs, the doctor makes a provisional diagnosis. Adequate investigations and treatment are then entered into the application. Finally, a printed report is generated which includes the patient’s complaint, provisional diagnosis, and treatment advised by the doctor [Fig. 2].

Necessary demographic details related to the patient’s age, gender, residential address, provisional diagnosis, and medicines prescribed were noted.

Categorical variables were measured as percentages, and continuous variables were measured as mean. Statistical analysis was not applied due to the descriptive nature of the study.

Results

A total of 5138 patients were teleconsulted over 9 months, with an average consultation of 17 per day. The mean age of

these patients was 37.64 ± 19.34 years, with 44% males and 56% females. Out of 5138 calls, 382 (7.4%) were wrongly addressed cases and were related to other specializations.

Most of the teleconsultation calls were made from Palwal district (19.8%), followed by Hisar (14.5%) and Sonipat. Fig. 3 highlights the district-wise distribution of teleconsultation calls made through e-Sanjeevani at our hospital.

Dry eye accounted for the majority of the patients (21%), followed by allergic conjunctivitis (18%), cataract (15%), and refractive error (14%). Less common eye problems reported were sty (4.4%), blepharitis (2.3%), congenital nasolacrimal duct obstruction (2.3%), pterygium, subconjunctival hemorrhage (2.2%), periorbital edema (1.4%), and pterygium (1.3%). Rare eye diseases reported were xanthelasma, episcleritis, and acute conjunctivitis. Provisional diagnosis could not be made in 8.9% of cases. Table 1 highlights the list of provisional diagnoses made through teleconsultations.

A majority of these patients could be managed medically on telemedicine (56.6%). Diseases such as cataract, diabetic retinopathy, and optic nerve evaluation required referral to a nearby ophthalmologist for a complete examination, evaluation, and surgical management (11.6%). Furthermore, 21.7% of patients with refractive error or presbyopia were referred to a nearby optometrist for refractive correction.

Carboxymethyl-cellulose and olopatadine were the most common topical drugs prescribed. Table 2 provides a detailed description of drugs prescribed to the patients.

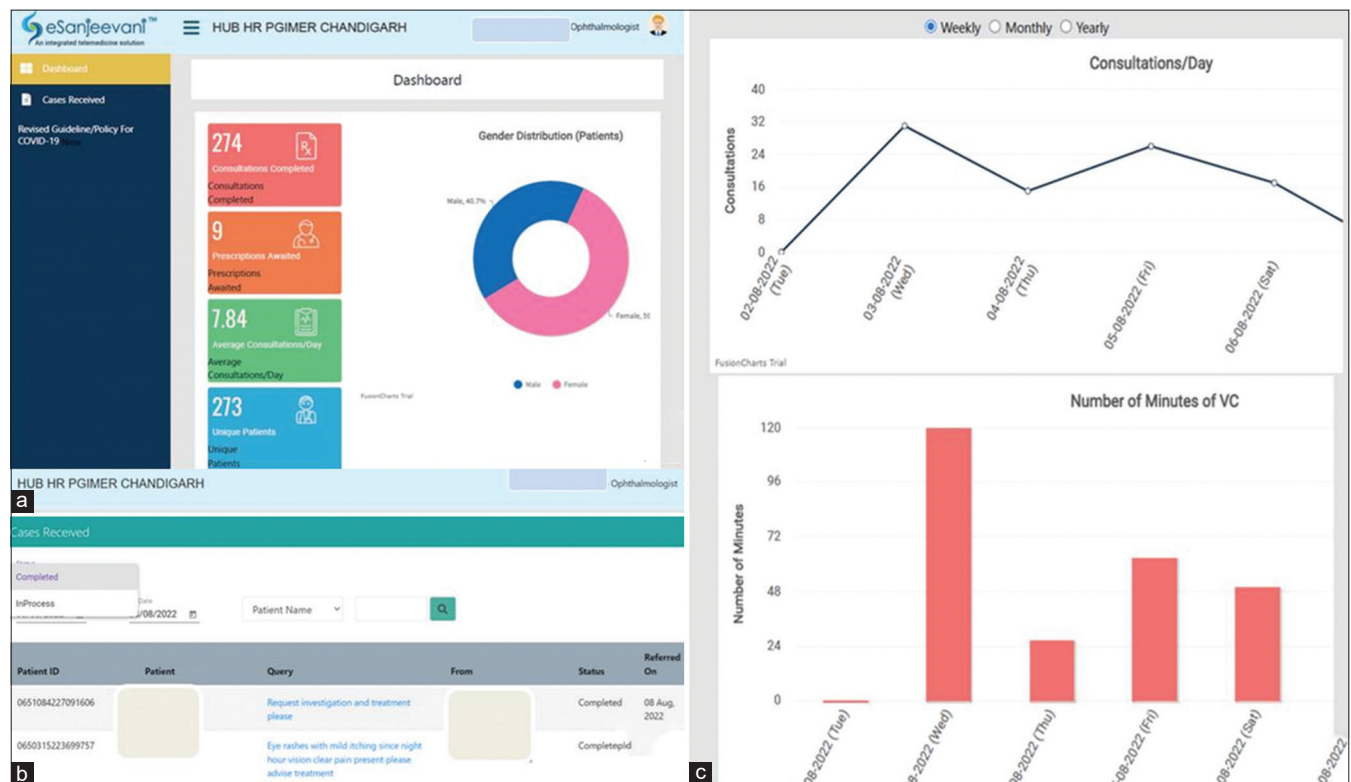


Figure 1: Snapshot of e-Sanjeevani application showing doctor’s dashboard with details of consultations made (a and b); line diagram showing weekly/monthly/yearly consultations made by the doctor (1c, upper panel); and bar graph showing minutes of video conferencing done by the doctor (1c, lower panel)

eSanjeevani™
An integrated telemedicine solution

Teleconsultation Id: [REDACTED] **Age:** 20 Year(s)
CR No: [REDACTED] **Gender:** FEMALE
Patient: [REDACTED] **Mobile:** [REDACTED]
Address: [REDACTED]

Problem:
Red eye, Watery eye
Problem Note:
Foreign body right eye

Query:
Request investigation and treatment please

Provisional Diagnosis Note: ACUTE CONJUNCTIVITIS

Rx:

Sl.No.	Medicine	Frequency	Dose	Type	Duration
1	Moxicip Dps eye 5 mg/1mL eye solution Cipla Limited	QID	1	drop(s)/tsp(s)	2Week
2	CarboxymethylCellulose 5 mg/mL eye drops	QID	1	drop(s)/tsp(s)	2Week

Advice:
AVOID EYE RUBBING. MAINTAIN EYE AND HAND HYGIENE. AVOID RUBBING THE OTHER EYE.

Figure 2: The printed prescription given to the patient showing chief complaints, provisional diagnosis, and treatment advised by the doctor

Discussion

e-Sanjeevani was initiated in 2020 under the Ayushman Bharat scheme of the Government of India to provide teleconsultations to patients located in remote areas.^[2,3] Since its introduction, there has been a boost to digital health, with over 1.6 crore consultations done so far. e-Sanjeevani has established itself as a parallel stream of health care services delivery. With over 1 lakh doctors and paramedics on board, teleconsultations are provided in various specialties such as medicine, pediatrics, ENT, ophthalmology, psychiatry, dermatology, orthopedics, and obstetrics and gynecology. The index study looked at the demographic details of patients seeking teleophthalmology consultations at a tertiary hospital in north India.

The mean age of our patients was 37.64 ± 19.34 years, with 44% males and 56% females. Similarly, in a study by Verma *et al.*,^[4] the predominant age group seeking teleophthalmology consultations was between 21 and 40 years of age. This highlights the fact that most of these patients are the primary

wage earners of the family and find it difficult to leave their hometown and travel to get medical treatment at a district tertiary hospital. This also highlights the fact that older people are more ignorant about their health and prefer to stay home or try home remedies.^[5-7] On the contrary, young people in today's time are more aware and educated and thus tend to seek medical advice early.

There was an unequal distribution of teleconsultation calls, with the majority of the calls made from districts of Palwat, Hisar, and Sonipat, and no calls were received from centers located in Panipat, Rohtak, Nuh, and Charkhi Dadri. Lack of manpower, lack of public awareness about available teleconsultation services, and poor network connectivity may be a few reasons for unequal call distribution.^[8] These factors should be urgently addressed by the local authorities to allow widespread distribution of teleconsultation services across the state of Haryana.

Our study showed that anterior segment problems such as dry eyes, allergic conjunctivitis, stye, and blepharitis can

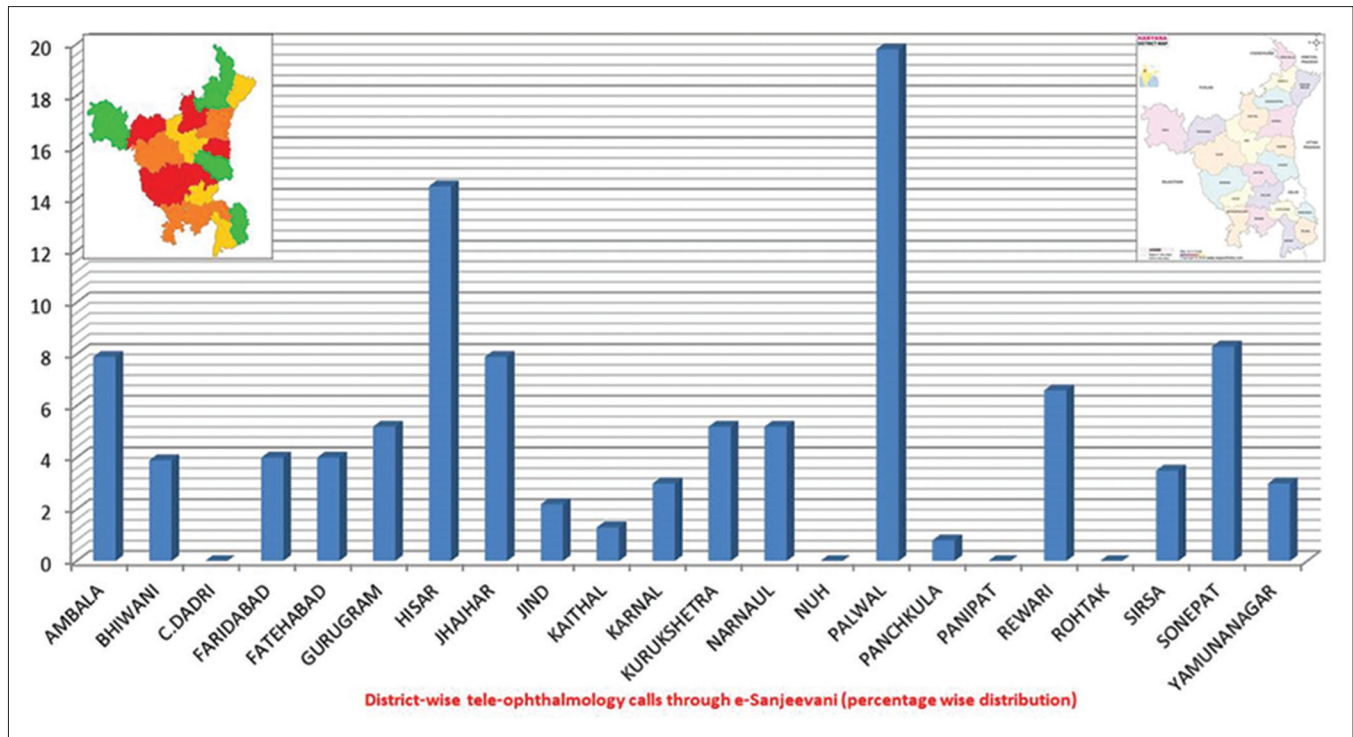


Figure 3: Bar graph showing district-wise distribution (in percentage) of teleconsultations made to our tertiary care center

be easily diagnosed and managed using the e-Sanjeevani platform. Similarly, Verma *et al.*^[4] have shown the feasibility of a teleophthalmology setup to diagnose and manage patients with adnexal and orbital problems. In a study by Misra *et al.*,^[9] lens-related (38.3%) and ocular surface pathologies (30.2%) were the most common diagnosis made. The use of the eyeSmart EMR application along with slit-lamp examination allowed vision technicians to capture good-quality anterior segment pictures. This probably explains the high likelihood to diagnose cataract as compared to our study, where slit-lamp examination was not possible.

Patients diagnosed with refractive error were referred to an optometrist. Patients requiring detailed evaluation for cataract, diabetic retinopathy screening, or optic nerve evaluation were referred to a nearby ophthalmologist. Fundus evaluation could not be done due to the lack of fundus cameras at the peripheral centers at present.

The e-Sanjeevani application allows the doctor to select a range of medicines available at the peripheral centers. The application allows the doctor to select the frequency, dosage, mode of drug delivery, and duration of treatment. The prescribed drug can then be easily explained and dispensed to the patient by CHO. Carboxymethylcellulose and olopatadine hydrochloride were the most common topical medications prescribed.

The majority of our patients (56.6%) could be managed through teleconsultations, and the rest of them were referred to an ophthalmologist. The referral rate was higher in a study by Misra *et al.*^[9] This was probably because of more number of cataract patients being diagnosed by them using the eyeSmart app and thus more referrals to higher centers. Teleophthalmology is an effective tool to triage urgent referrals such as trauma, chemical injuries, and retinal detachments. This allows for better structural

Table 1: Provisional diagnosis made through teleconsultation

Provisional diagnosis	Number (percentage)
Dry Eyes	1085 (21.1%)
Allergic Conjunctivitis	921 (17.9%)
Refractive Error	799 (15.5%)
Cataract	726 (14.1%)
External Hordeolum/Stye	227 (4.4%)
Blepharitis	120 (2.3%)
Congenital Nasolacrimal Duct Obstruction	117 (2.3%)
Subconjunctival Hemorrhage	116 (2.2%)
Allergic Reaction/Periorbital Edema	73 (1.4%)
Pterygium	68 (1.3%)
Xanthelasma	21 (0.4%)
Episcleritis	13 (0.2%)
Acute Conjunctivitis	9 (0.2%)

Table 2: Most commonly prescribed medicines

Medicine	Number (percentage)
CMC (Carboxy Methyl Cellulose)	1957 (38%)
Cetirizine	411 (8%)
Carmellose sodium	354 (6.9%)
Olopatadine	293 (5.7%)
Moxifloxacin	236 (4.6%)
Ibuprofen	214 (4.2%)
Ciprofloxacin	173 (3.4%)
Doxycycline	117 (2.3%)
Augmentin	101 (1.9%)



Figure 4: Various images clicked using a smartphone and uploaded on e-Sanjeevani. The images were reviewed by teleophthalmologist and a provisional diagnosis of external hordeolum (a), spontaneous subconjunctival hemorrhage (b), and white cataract (c) was made

and functional outcomes in such cases. Unnecessary referral of patients which can be managed easily at SCs, PHCs, and CHCs through teleconsultation adds to treatment costs, including transportation charges, and patient burden at tertiary care centers.

Apart from this, teleconsultation helps in providing health education to the patients as well as the health care providers at the primary and community health center level.^[10,11] Interdisciplinary opinions can also be taken among various other departments as in the case of polytrauma. In today's era

of the ongoing pandemic, teleconsultation provides a channel to safeguard both the patient as well as the physician.

The provision of audio and video conferencing in e-Sanjeevani allows the doctor to interact with a patient and understand his complaints in a better way. It is similar to live face-to-face interaction. In addition, if audio-video conferencing is not possible due to poor network connectivity, the CHOs have the provision to upload the images of the patient. The images can be captured using a smartphone camera and then uploaded along with the patient's case sheet. This allows the doctor to analyze the images and reach a provisional diagnosis. Fig. 4 demonstrates various clinical presentations where the diagnosis was possible based on the clinical photograph clicked on a smartphone camera by CMO.

Our study had a few limitations. First, retinal details could not be assessed in any of our patients due to the lack of a fundus camera at peripheral SCs, PHCs, and CHCs. Similarly, fine details of the anterior segment were not possible due to the lack of any slit lamp-based imaging devices. Despite this, suspected patients with retinal and uveitic diseases were urgently referred to a nearby ophthalmologist, thus avoiding any delay in treatment. Second, poor network connectivity in some areas did not allow good audiovisual conferencing and thus a definitive diagnosis was not possible.

Conclusion

To conclude, e-Sanjeevani is an effective tool in establishing an ocular diagnosis and providing timely intervention. It is useful in providing teleophthalmology consultations to remote areas, thus overcoming the barriers of distance, time, and cost. Future developments in technology and the introduction of slit lamp-based and fundus cameras would allow doctors to assess anterior segment and fundus details in a better way and thus triage and treat the patients accordingly.

Financial support and sponsorship

Ayushman Bharat Scheme, National Health Mission, Haryana, India.

Conflicts of interest

There are no conflicts of interest.

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