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A Cross-Sectional Study to Determine the Use of Online Healthcare Consultancy and Services for Non-communicable Diseases in Middle Age Population during COVID-19 in Bilaspur Chhattisgarh

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Abstract

The aim of this study is to determine the prevalence of use of online healthcare services in urban population age between 40 and 60 years in Bilaspur Chhattisgarh before and during COVID-19 and also to get idea about convenience, affordability, and satisfaction of online healthcare services for non-communicable diseases during COVID-19 in middle-age adults in Bilaspur. The ethical committee of the University of Hyderabad approved this Cross-sectional study which was done using the cluster sampling method, including five major areas of Bilaspur city. Online questionnaire was used containing 11 compulsory questions (objective type) and 3 questions were optional. Data were analyzed using Microsoft Excel and R studio. Responses of 200 participants who are suffering from non communicable diseases (NCDs) were recorded. The prevalence of participants using online healthcare services before COVID 19 is 22.5 and during COVID 19 is 36. Chi-square test was done in the project for 95% confidence interval and the p value came out to be 0.003001, which is significant. There is a positive correlation between convenience, affordability, and satisfaction. More participants are using online healthcare services during COVID-19 for NCDs in Bilaspur. The use of online healthcare services is more in males compared to females.

Keywords: COVID-19, Middle age population, Non-communicable diseases, Online healthcare services, Telemedicine

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INTRODUCTION

Non-communicable diseases (NCDs), also known as chronic diseases, are not passed from person to person. They are long duration and generally slow progression: (WHO, 2011). NCDs kill 41 million people each year, i.e., 71% of all deaths globally. During the COVID-19 pandemic maintaining social distancing is very important, especially for vulnerable population who are suffering from NCDs such as diabetes, hypertension, respiratory, and heart disease. The mortality rate is also higher in these sections of people (Mortality rate 60–90%).

About 15 million people die from NCDs from age between 30 and 69 years each year of which 85% 0f these deaths are premature.[1] Age is also a contributing factor in increase the susceptibility of COVID-19 so middle-age people (40–60 years) is also very vulnerable. This problem leads to look at the option of contactless healthcare consultancy by the use of online healthcare consultancy services such as websites on Internet, telemedicine, mHealth, and mobile applications. These are considered as an important factor in achieving universal health coverage as doctorpatient ratio in India is 1:1456. (The Economy Survey 2019-2020). In Chhattisgarh, it is even worse. During the COVID-19 pandemic, situation has become even worse.[2]

This study aims to find the prevalence of use of these online healthcare services for NCDs in middle-aged adults from 40 to 60 years and its satisfaction, convenience, and affordability. According to the study "Health of Nation's state" conducted by ICMR, PHFI and IHME for the duration of 1990 to 2016, in Chhattisgarh the burden of cancer was 11.6%, cardiovascular disease was 33.5%, diabetes was 7.3% and injuries was 7.2%. According to the same study, there is an increase in susceptibility towards NCD as the age increases compared to getting burden of communicable diseases in the same group.[3] There are various online healthcare services available in Bilaspur Chhattisgarh like phone numbers of doctors to consult online, various healthcare applications. The reach and use of these online healthcare services for NCDs patients in Bilaspur, aged between 40 and 60 years is to be determined in this study. This study will also throw light on the gender perspective of reach towards e-Health. According to the study "Health of Nation's state" conducted by ICMR, PHFI, and IHME for the duration of 1990 to 2016, in Chhattisgarh the burden of cancer was 11.6%, cardiovascular disease was 33.5%, diabetes was 7.3% and injuries was 7.2%.

The use of Internet is very less in middle age population in India compared to the other age group. According to the distribution of Internet users in India between January and November 2019 by age group, people falling in the age group 40–60 years use approximately 15% Internet compared to other age group.[4]

The aim of this study is to determine the prevalence of use of online healthcare services in urban population age between 40 and 60 years in Bilaspur Chhattisgarh before and during COVID-19 and also to get idea about convenience, affordability, and satisfaction

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Table 1: Percentage of non-communicable diseases present in the sample and preferred online healthcare services in Bilaspur

Diabetes (0)	*Hypertension (1)*	*Heart problems (2)*	*Stroke (3)*	*Cancer (4)*	*Obesity (5)*	*Cholesterol (6)*	*Asthma (7)*	*Bone Problems (8)*	*Depression (9)*	*Others (10)*
16.5%	13.5%	6.5%	0%	1.5%	12%	7.5%	6.5%	9%	7%	20%
Preferred online healthcare services										
Online Health Websites (0)		*Telemedicine on video call (1)*			*Healthcare Applications on mobile (2)*		*M Health (3)*		*Others (4)*	
15%		11.5%			30%		34.45%		9.2%	

Table 2: Gender distribution and percentage of use of online healthcare services before and during COVID-19

Gender distribution in sample		
Female	*Male*	*Others*
32%	67%	1%
Use of online healthcare services before Covid-19 with respect to gender		
Female	*Male*	*Others*
9	35	1
20%	78%	2%
Use of online healthcare services during Covid-19 with respect to gender		
Female	*Male*	*Others*
26.38%	72.22%	1.38%

of online healthcare services for non-communicable diseases during COVID-19 in middle-age adults in Bilaspur.

Objectives of the Study

To determine the prevalence of use of online healthcare services in urban population age between 40 and 60 years in Bilaspur Chhattisgarh before and after COVID-19.

To determine convenience, affordability, and accessibility of online healthcare services for NCDs during COVID-19 in middle-age adults in Bilaspur.

To determine the use of online healthcare services in males and females of urban population aged between 40 and 60 years in Bilaspur Chhattisgarh before and after COVID-19 an compare them.

Methodology

This is quantitative study which is cross-sectional in design, conducted. Cluster random sampling is performed in the five major areas of the city. Four main hospitals and active NGOs dedicated to healthcare sector in the area were contacted to get data about the people suffering from NCDs for the past few years.

Inclusion Criteria for the participants in the study

1. People of age 40–60 years
2. All genders are included
3. Residents of Bilaspur, Chhattisgarh
4. Having risk factors such as overweight, hypertension, and high cholesterol level. Tobacco use, alcohol consumption)-Including all non-communicable diseases.

Exclusion criteria for the participants in the study

1. People suffering from communicable diseases
2. People suffering from COVID-19
3. People suffering from NCDs and COVID-19, both.
4. People admitted in hospitals due to NCDs such as stroke, cardiovascular diseases, and cancer.

The population of Bilaspur Chhattisgarh in 2019 is estimated to be 490,533. There was no separate population size for the age group of 40–60 years. So the whole urban population of Bilaspur was taken into consideration. By considering confidence interval as 95%, the value of Z score is 1.96. Margin of error is taken as 5% that is 0.05.

By considering this population the sample size we will be calculates as

$S=Z^2 * P(1-P)/M^2$

S=Sample size for infinite population

Z=Z score

P=Population proportion (assumed to be 50% that is 0.5)

Since the population of Bilaspur is 490533 and S is 384.16, to calculate the sample size for this study we will apply the following formula

$s= S/1+(S-1)/\text{population of Bilaspur}$

Hence, we get the value as 383.86 which can be taken as 384.

A total of 500 participants was selected for the study. Questionnaire containing 11 compulsory questions (objective type) and three questions were optional requiring to describe participant's own thoughts about convenience, affordability, and satisfaction regarding online healthcare services was given to the participants of Bilaspur, in the mode of jot form/paper form, along with informed consent and participant information sheet. The questionnaire and informed consent form were both in English and Hindi. The responses were recorded in the form and an excel sheet was created to segregate and contemplate the data which was collected through form. Data analysis was done using R programming and Microsoft excel. Prevalence of use of online healthcare services for NCDs before and during COVID-19 was determined using the formula and hypothesis testing was done by using Chi-square test between use of online healthcare services for NCDs before and during COVID-19. Correlation between convenience, satisfaction, and affordability in using online healthcare services for NCDs among middle-age population was also calculated.

Thus, outcomes will be the prevalence of use of online healthcare services for NCDs among middle-aged population in Bilaspur before and during COVID-19 and percentage of participants in the study who find online healthcare services convenient, affordable and satisfactory. The gender disparity in the use of online healthcare services will also be the output in the end and hence fulfilling all the objectives of the study.

COVID-19 and internet access to the people living in different areas of Bilaspur city can act as effect modifier, Confounder in the study can be socioeconomic status and educational status of participants in the study.

The approval for the study was granted by the ethical committee of the University of Hyderabad. The participants were provided participant's information sheet and informed consent was in written form. There is no personal information or images in the study which can cause recognition of the participants in the study.

Table 3: Regarding convenience, affordability, and satisfaction from online healthcare services in percentage

Convenience of online healthcare services					
Cannot say	*No convenient at all*	*Poor convenience*	*Average convenience*	*Good convenience*	*Excellent convenience*
15.7%	7%	5.8%	20.3%	40.11%	11%
Affordability of online healthcare services					
Cannot Say	*Not affordable*	*Poorly affordable*	*Partially affordable*	*Completely affordable*	
17.45%	12.4%	10.56%	41.6%	28.9%	
Satisfaction from online healthcare services in sample					
Cannot say	*No satisfaction*	*Poor satisfaction*	*Partial satisfaction*	*Complete satisfaction*	
3.06%	12.27%	8%	52.76%	23.9%	

Table 4: Chi-square test values for the sample

Observed values			
	Before COVID-19	*After COVID-19*	*Total*
Use of OHCS	45	72	117
No use of OHCS	155	128	283
Total	200	200	400
Expected values			
	Before COVID-19	*After COVID-19*	*Total*
Use of OHCS	58.5	58.5	117
No use of OHCS	141.5	141.5	283
Total	200	200	400

Table 5: Opinions of people in Bilaspur regarding convenience, affordability, and satisfaction from online healthcare services

Positive	*Negative*
Opinion about convenience	
Easily available	No knowledge
Feasible	No face-to-face talk
Very useful during lockdown	Difficult to build trust
Maintaining proper health during lockdown	Difficulty in understanding
Hospitals were only available for emergency	Poor network
Time saving	Operational issues
User friendly	
Opinion about affordability	
Easy consultancy	Fees and medicine
Affordable internet	Some physicians charge more fee
Opinion about satisfaction	
Doctors were very helpful	For emergency only
Explained prescription in detail	No physical check up

Results

Out of 500 participants, only 230 responded among which 200 were valid responses consisting of 134 males, 64 females, and 2 others. Most responses were from the participants falling in the age group of 40 years and least were from the age group of 57 years.

Participants in the sample are mostly suffering from diabetes, followed by hypertension with no case of Stroke, Table 1. NCDs mentioned apart from mentioned ones included poor vision close to blindness, cataract, road traffic accidents, Mental health conditions such as anxiety, dental issues like caries, bleeding gums.

Eighty-seven participants favored using about the online healthcare services and the most sought out online healthcare service is mHealth, closely followed by Health applications on mobile. The services mentioned in others section was consulting doctor through WhatsApp and landline phone, Table 2..

Before the COVID-19 pandemic in Bilaspur, nine out of 64 females responded positive regarding use of online healthcare services, 35 out of 134 males and 1 out of two other gender used the online healthcare services.19 out of 64, 52 out of 134, and 1 out of 2 other genders responded positive to the use of online healthcare services during the COVID-19 pandemic in Bilaspur.

Out of 200 participants, 172 participants responded for the question regarding the convenience of online healthcare services, 161 people responded regarding affordability of online healthcare services and 163 participants in the sample responded regarding satisfaction of online healthcare services. 45 participants had used online healthcare services before COVID-19 for the NCD they are suffering from and during COVID-19 and 72 participants used them. Hence, the prevalence of people using online health-care services before COVID-19 was 22.5, and the prevalence of people using online health-care services during COVID-19 is 36, according to the sample , Table 3..

The alternate hypothesis states that there is a significant change in the use of online healthcare services for NCDs during COVID-19 pandemic among middle-age population in Bilaspur. By applying Chi-square test, the p value calculated is 0.003001, which is less than 0.05. (For 95% confidence interval), Table 4.

Correlation between convenience and affordability is 0.669, which is strong positive correlation, t = 11.227, df = 115, $P < 2.2e{-}16$, 95% confidence interval, between convenience and satisfaction it is 0.656, which is positive correlation, t = 10.895, df = 157, $P < 2.2e{-}16$, 95% confidence interval and between satisfaction and affordability it is 0.7056, which is strong positive correlation. t = 12.438, df = 156, $P < 2.2e{-}16$, 95% confidence interval.

	Convenience	*Affordability*	*Satisfaction*
Convenience	1		
Affordability	0.669680084	1	
Satisfaction	0.656150732	0.705641543	1

Three subjective questions requested participants to specify the reason for marking their responses about the convenience, affordability, and satisfaction from online healthcare services. This was done to know exact reasons behind their response.

Discussion

We can clearly see that the prevalence of using online healthcare services for NCDs has increased among the sample during the COVID-19 pandemic among middle-age population in Bilaspur and most prevalent being diabetes closely followed by hypertension, Figure 1. Most participants in the study find mHealth as preferred online healthcare to use, Figure 2.

The data shows that the use of online healthcare services is more in males compared to females as out of 64 females in the study nine used online healthcare services before COVID-19 which is 14.06 % and 19 used online services during COVID-19 which is 23.44%. Out of 134 males in the study 35 males used online healthcare services before COVID-19 which is 26.12 and 52 males used online healthcare services during COVID-19.

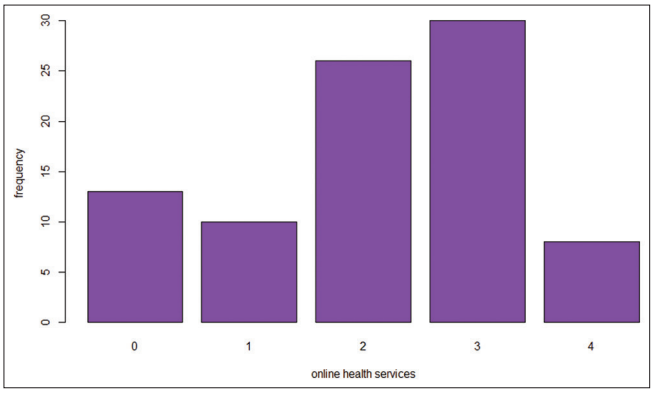

Figure 1: Graph showing preference of online healthcare services

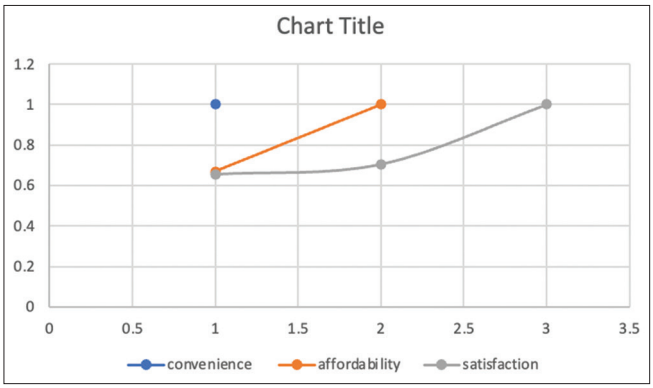

Figure 2: Correlation graph between convenience, affordability and satisfaction regarding online healthcare services

In the data, the number of female responses is less than half compared to the male responses but the point to be noted here is that there is just double increase in the use of online healthcare services in females during the COVID-19 pandemic compared to before COVID-19 in the data, that is, it has increased from 9 females using it before to 19 females using it during the period of pandemic. If we compare the same in males than there is 1.5 time increase that is from 35 males it has increased to 52 males. This is a good sign of improvement in equal use of online healthcare services among male and female but there is still need of more equal involvement and participation of women.

Majority of the participants believe that online healthcare services are good according to their convenience, i.e. 40.11 % chose it. Rest of the 28 participants had no opinion about this, most of the participants find these services are partially affordable, i.e., 41.6 % marked for this option. Rest of the 39 participants have left answer to this question and majority of the participants find it to be partially satisfactory, i.e., 52.8 % chose this option. Rest 37 participants did not respond for this question. The participants who have not used any online healthcare services for the NCDs they are suffering from also answered these three questions as it will help to know about what are the barriers which are preventing them to use these services apart from the people who used it and faced problems. These barriers can be physical, physiological digital, economical, technical, related to literacy, religion, and opinion.

provides us inputs not only about the changes we need to make for the people using online healthcare services but also about the barriers which are preventing their use among the middle-age population in Bilaspur for non-communicable diseases.

In Table 5 we can see that the people find online healthcare services easily available at the time of lockdown as most of the hospitals were dedicated in treating COVID patients and private clinics were not mostly open. This helped them in properly maintaining their health at the time of crisis. Some people also stated that it was time saving to use online healthcare services as they did not have to go to hospital or private clinic and also do not have to wait in lines. They can arrange their appointment at their convenient time and can consult doctor from anywhere they are, thus making the services user friendly. On the other aspect participants also complain about having no knowledge of availability of online healthcare services and also about no idea how to use them. Participants using mobile Heath and voice calls also complained about having no face-to-face contact with the doctor which made it difficult for them to build necessary trust and comfort. Due to poor connections and unclear voice, it was difficult from them to understand what doctor is advising them also caused hinderance to them to explain their problem to doctor conveniently. Some people were using online healthcare services for the 1 time so they had some issues in handling it.

Affordable Internet played a significant plus point is using online healthcare services. People in the study also mentioned that getting consultancy through online healthcare services was easy. Though the negative points were high fees charged to the patient and the medication prescribed to them were sometimes not available in the local medical store. Participants in the study found the doctors in online healthcare platform were very helpful and cooperative. They listened to them patiently and explained the prescription and other suggestions in detail and in a way which was easy to understand for patient. Still people in the study considered the use of online healthcare services only as option during emergency situations. They feel that the lack of physical check-up does not give them satisfaction of correctly and thoroughly examined and diagnosed.

After considering the above points with respect to online healthcare services regarding patient's perspective regarding convenience, affordability, and satisfaction, calculating the correlation between them will help to improve them better.

The correlation between convenience and affordability, convenience and satisfaction, and affordability and satisfaction will show us that how they affect each other. They all show positive correlation and hence making us understand that it is very important to work on all three variables (convenience, affordability, and satisfaction) to get better results from the online healthcare services as they complement each other. Working on one will also make the other two improve to better extent.

Conclusion

The null hypothesis for the study is that there is no significant change in the use of online healthcare services for NCDs before and during the COVID-19 pandemic among middle-age population in Bilaspur is rejected and the alternate hypothesis that there is a significant increase in the use of online healthcare services for NCDs during COVID-19 pandemic among middle-age population in Bilaspur is accepted as the *P* value is 0.003 and the alternate hypothesis is significant.

According to data, the increase of use during pandemic may be because of emergency scenarios [5]. The use of Internet is not

common in middle age group which can act as a barrier as most people falling in middle age group. In the study, most people preferred mHealth which signifies that the middle age group is comfortable in using mobiles and other wireless devices [6,7]. This can act as a positive point toward the further spread of online healthcare services in small cities such as Bilaspur [7,8,9,10]. Use of online healthcare services mostly for diabetes and hypertension. The reason can be that these diseases require life style changes and medicine prescription, which is very convenient to treat through tele-medicine. There are digital devices available to keep check on diabetes and hypertension and they can be used very conveniently by the patients in home.

The patient perspective toward online healthcare services is a very crucial factor in making it available to large scale as they are beneficiaries[11]. The positive correlation between convenience, satisfaction, and affordability shows that all are synergistic to each other.

Making use of online healthcare services for NCDs more popular in Bilaspur among the middle age by spreading awareness of its benefits like easy reach to the best doctors living in big cities, having access to better consultation and treatment. Development of more user friendly and simple technology. Bridge the gender gap in the use of online healthcare services in Bilaspur. Improving quality of services according to people's need [13,14,15,16].

The data were collected from almost all major parts of Bilaspur through cluster random sampling with strict inclusion and exclusion criteria being followed to get a representative sample but due to COVID-19 second wave and lockdown, the data collected was not equal to the sample size calculated. More responses from males compared to females. Since most of the data collection was through online form, people who are not having enough technological support or who do not know how to use them properly may not able to participate in the study. Response bias because not all the people who were included in the study responded to the questionnaire.

Recommendations

Making online healthcare services for NCDs more popular in small cities.

To create awareness among the people in small cities, especially of the middle age group about the benefits of using online healthcare services for NCDs which can help them to reach the best doctors living in big cities and thus they will be able to get better consultation and treatment.

For middle-age group, the development of more user friendly and simple technology so that they can gain benefits of online healthcare services as this can help them to keep continuous monitoring of their health with the best doctors.

Try to bridge the gender difference in the use of online healthcare services in Bilaspur.

Increasing the quality of services provided by online healthcare services to increase the satisfaction of treatment which the people receive.

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