UNDERSTANDING THE MARKET DEMAND PATTERN AND PRESCRIBING BEHAVIOR OF DOCTORS FOR VITAMIN DRUGS IN THE INDIAN PHARMACEUTICAL MARKET UNDER THE COVID-19 PANDEMIC SITUATION: A CASE STUDY OF VITAMIN D3 AND ITS PROMOTIONAL STRATEGY

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ABSTRACT

In the face of the COVID-19 pandemic demand for vitamins by consumer rises as customers look to support their immune health, overall wellness, and reduce anxiety. Consumers have increasingly turned towards vitamin products and expressing greater interest in engagement with the vitamins. The study helps to understand how COVID-19 impacts vitamin consumption in the Indian pharmaceutical market. In 2020-21 demands for vitamins would continue to rise in the Indian pharmaceutical market. It is wise for suppliers, manufacturers, and retailers, of vitamins to begin preparing now for the future markets where demand for vitamins by consumers continues to grow beyond its historical aspects. The research focuses on a case study of Vitamin D3.

And also this study helps in understanding the prescribing behavior or pattern of the customer's (doctor's) brand preference for these Vitamin D3 categories in this pandemic; how this pandemic has led to an increase in the prescription generation for vitamins.

The study was done in the region of Prayagraj district (Uttar Pradesh) among the Specialist Doctors/ Physicians and retail Chemists around the hospitals/ nursing homes and other localities over telephonic survey, with the help of structured questionnaire for knowing their prescribing behavior, its demand pattern and effective promotion strategy of Vitamin D3 among them. The results show the rise in its consumption in this pandemic situation. Hence, contribute to capturing the market demand for vitamins in the present and future.

Keywords	Consumer demand, Vitamin, Prescribing behavior, COVID-19
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INTRODUCTION

Vitamins are substances that are required for the normal growth and development of the human body. There are 13 vitamins that the body required, namely, Vitamin A, Vitamin B, Vitamin C, Vitamin D, Vitamin E, and Vitamin K (MedlinePlus, 2020). All over the world, most people use multivitamins daily for treatment or prevention of chronic disease. The wide availability of vitamins and uncontrolled advertisements about these agents increases consumption among people (Cheryl L Rock, 2007).

Widely vitamins used as a source of dietary supplements and commonly prescribed medication by physicians for mild illness to severe chronic illnesses. It also helps in enhancing wellbeing and enhancing immunity (Marcus R, Conlston AM, 2001). In a drug utilization study in one of the secondary care hospitals, Maharashtra found that multivitamin products were contained by 16% of the prescriptions. Furthermore, more than one vitamin supplement was contained by 2% of the prescription (Potharaju HR, Kabra SG, 2011).

About 20% of Indians consume vitamins daily, and 18% take vitamins once or twice a week, according to Euromonitor International's Health & Nutrition Survey, 2018. Vitamins demand boosted due to the COVID-19 pandemic. Mainly those associated with immune system enhancers, including both multivitamins and Vitamin C. In the initial phase of lockdown in many stores, there is a shortage of Vitamin C due to the surge in demand for Vitamin C, leading to it being out of stock (Euromonitor International, 2020).

In 2020 according to the report of Statista, 2020 revenue in the segments of vitamins and minerals to US$168.82m. Furthermore, the market was expected to grow by 4.7 percent annually.

An increase in social media usages and rapid digitization has increased awareness regarding nutrition care, and also access to vital information has improved. For the growth of India's dietary supplements market, rising per capita income and rapid growth of the e-commerce market are the major drivers (BUSINESS WIRE, 2018).

Due to Vitamin D's immunomodulation role, its insufficiency affects the immune functions (Cameron F. Gunville, Peter M. Mourani, Adit A. Ginde, 2013).

Acute respiratory tract infections are associated with the decrease in levels of Vitamin D proved by clinical studies. By secretion of antiviral peptides, innate immunity increases, thus improve mucosal defenses (Nurshad Ali, 2020).

Some recent reviews hypothesized that the insufficiency of vitamin D3 might compromise the respiratory immune function, thus increasing the risk of COVID-19 severity and mortality. The correlation of Vitamin D levels with COVID-19 severity and mortality is shown by various retrospective studies (Brown Robert Andrew, Sarkar Amrita, 2020). SARS-CoV-2 during infection uses the immune evasion process, which is followed by cytokine storm and hyper reaction cytokine storm in some patients (Juan Garcia-Revilla, Tomas Deierborg, Jose Luis Venero, Antonio Boza-Serrano, 2020).

As per the researchers' report, the prevalence of severe Vitamin D deficiency (defined as 25(OH)D less than 25 nmol/L) with the death rate per million people due to the COVID-19 is significantly and strongly correlated. Various data support a correlation between levels of Vitamin D and COVID-19 mortality rate. That shows the association between a low level of Vitamin D and disease severity due to COVID-19. These findings do not necessarily mean low Vitamin D levels raise the COVID-19 death rate or that normalizing the Vitamin D level would bring this rate down. However, researchers also opined that other variables such as unknown genetic factors and inadequate healthcare services could account for a higher COVID-19 mortality rate and a higher prevalence of vitamin deficiency. Additional data in the US shows that blacks and Hispanic Americans' mortality rate due to COVID-19 is larger than among the general population. It shows that as compared to other groups, these groups have low levels of Vitamin D (Pugach IZ and Pugach S, 2020).

India receives adequate sunlight all year round is in the tropical zone near the Equator; however, humid and hot weather perhaps keep them away from enough sunlight. Therefore, the majority of the Indians are deficient in Vitamin D levels, nor do they take enough Vitamin D supplements in their food products (Aparna, P et al., 2018; Padhi, S et al., 2020). Recent developments have also shown the role of Vitamin D in enhancing immunity and counter chronic inflammation and infections, besides its earlier role of calcium, phosphorus, and skeletal metabolism (Verma, R et al., 2017). These above facts have enabled the prescribing doctors to write Vitamin D as a significant component of prescription in patients with COVID infections in India.

On healthcare resources, physicians are the primary decision-maker. The prescribing decisions of the physicians are the key to hospital dominance over the health sector market players. The factors influencing the prescriber’s decisions are the most important input to devise a regulation for the pharmaceutical market, to develop guidelines for practice, and for the policy of healthcare. Prescribing decisions mostly influence by factors like physician's attributes, cost of medicine, promotion strategies, and pharmaceutical industries. The negative impact of a wide range of factors can be reduced by using valid and reliable practice guidelines and thus promoting rational prescribing effectively (Davari M, Khorasani E, Tigabu BM, 2018).

For the prescription demand generation, face to face product detailing to doctors was the conventional method that was the main means, but the new Internet-based initiatives also play an important role in the generation of demand (Ray Tapan J, 2013).

In the digital world, generating prescription demand is volatile, uncertain, complex, and ambiguous. In contrast with the consultants for a prescription generation, the promotional tools like gifts and support to seminars or conferences are sometimes more influential (Corckburn, 1997).

LITERATURE REVIEW

Indian pharmaceutical market: The Indian pharmaceutical market has unique characteristics. Firstly, 70-80% of the retail market sales consist of branded generic drugs. Second, a dominant position is driven by formulation development capabilities and early investments by local players. Low price levels driven by intense competition is the third one. India ranks 3rd in terms of volume and 10th rank in terms of value (https://www.mckinsey.com, 2020).

Vitamins: For vital functions of the body, vitamins are essentials. Based on age, pathological conditions, and physiological state, vitamins should be used in the right quantity to obtain maximum benefits (Murphy SP, White KK, Park SY, Sharma S, 2007).

Vitamin D: Through various mechanisms, Vitamin D can reduce the risk of microbial infections and deaths. Through the induction of antimicrobial peptides, Vitamin D enhances innate cellular immunity partly. It is also a modulator of adaptive immunity and enhances cellular immunity (Biancatelli RMLC, Berrill M, Marik PE, 2019).

On March 23, 2020, a former director of the Center for Disease Control and Prevention, New York City Health Department, proposed using Vitamin D to combat the COVID-19 (foxnews.com, 2020).

Cholecalciferol is known as Vitamin D3**.** Cholecalciferol is a kind of vitamin made by the skin when presented to daylight/ sunlight; it is also found in certain nourishments and can be taken as a dietary enhancement.

Pharmaceutical promotion: According to WHO, Pharmaceutical promotion is a set of all persuasive activities and informational activities that induce the prescription, purchase, supply, and use of medicinal drugs by manufacturers and distributors (Leonardo Alves T, Lexchin J, Mintzes B, 2019).

Two types of promotional activities by pharmaceutical companies are information provisions and gifts to clinicians. Information provisions in direct mail, e-promotion, medical journal advertising, meetings, visits of sales representatives at doctors' offices or a hospital setting, sponsored continuing professional education, and sponsored presentations at conferences (Anonymous 2013). Conference registrations on behalf of companies, free samples, honoraria and contractual funding for advisory board memberships, and reimbursements of official travel expenses, reimbursements to participating in official market seeding research, participation in speaker's bureaus, provision of patient education services or personnel for clinicians' practices and reimbursements for guest authorship include in gifts (Parker L, William J, Bero L, 2018).

OBJECTIVES OF THE STUDY

1. To understand the impact of COVID-19 on the use of Vitamin drugs in the Indian pharmaceutical market.
2. To study the impact of COVID-19 on the use of vitamin D3 in the Indian pharmaceutical market.
3. To understand the prescribing behavior of the doctors for vitamin D3.
4. To explore the Promotional tools which influence prescription writing of doctors in this COVID-19 pandemic.

RESEARCH METHODOLOGY

Study type: It is both exploratory and descriptive. Also, both qualitative and quantitative approaches have been adopted. A quantitative approach with a questionnaire and a qualitative approach with interaction interviews during questionnaire responses have been adopted (E Bell, A Bryman, B Harley, 2018).

Sampling technique: Here, the purposive sampling method was adopted.

Data collection: The data was collected through the field and online survey using a questionnaire and from secondary sources.

Sources of Data: The researcher collected the data from the Specialist Doctors/ Physicians and retail Chemists' response around the hospitals/ nursing homes and other localities over the telephonic survey and some on-field collections with the help of a structured questionnaire among Prayagraj regions of Uttar Pradesh, India. The question variables related to understanding and learning their prescribing behavior, demand pattern, and effective promotion strategy that affect their prescribing behavior among the different regions helped in doing quantitative analysis**.** The researcher has also referred to various articles, journals, and brochures on websites.

Study Timeline: One month (June 2020 – July 2020)

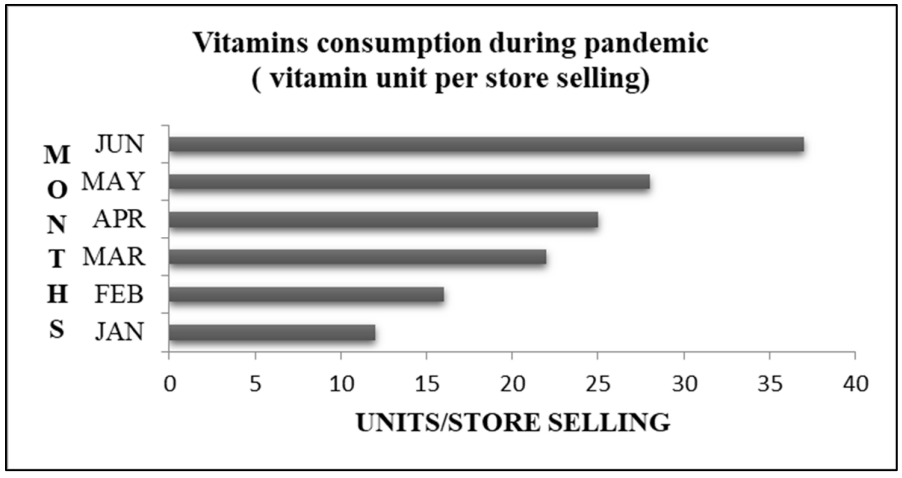
Sample size: The sample size was 70 (25 doctors and 45 chemists)

Data Analysis and Interpretation: The **a**nalysis and interpretation of the data have been carried out to deduce the conclusions with the aid of appropriate tools like bar charts, graphs, and pie-charts, etc.

ANALYSIS AND INTERPRETATION

Different graph and bar chart plots of Specialist Doctors/ Physicians and retail Chemists (25 doctors and 45 chemists) were done, which helped clarify the variables under the main study. The descriptive method of result analysis was adopted. Google Forms is used to generate bar charts, while Microsoft Excel is used to derive pie charts for analysis and interpretations. The averages were calculated based on the percent response.

Figure 1: Consumption of Vitamins during pandemic (COVID-19)



Source: Researchers survey

INTERPRETATION

1. Figure 1 shows that the consumption of vitamins increases month-by-month (day-by-day), followed from January to June 2020.

2. It shows that the monthly (daily within a month also) Vitamins units per store sales were increasing drastically in a linear manner during this pandemic year.

Table 1: Vitamin 25(OH) D levels in general adult population and mortality rates per million from COVID-19 in European countries and their correlation statistics

Country	Prevalence (%) of Vit. D < 25nmol/L	Prevalence (%) of Vit. D < 50 nmol/L	Mean (nmol/L) Vit. D	Population	COVID-19 Deaths	COVID-19 Deaths/million
UK	15.4	56.4	47.4	65761117	41747	635
France	6.3	34.6	60	67848156	29401	433
Belgium	7.3	51.1	49.3	11720176	9655	824
Germany	4.2	54.5	50.1	80159662	8801	110
Netherlands	4.9	33.6	59.5	17280397	6078	352
Ireland	6	45	56.4	5176569	1705	329
Denmark	0	23.6	65	5869410	597	102
Finland	0.2	6.6	67.7	5571665	326	59
Norway	0.3	18.6	5	5467439	242	44
Estonia	4.5	51	51.6	1228624	69	56
N= 10						
Correlation coefficient	**0.76**	**0.52**	**-0.57**			
T- statistics	3.33	1.72	-1.98			
P- value	**0.01**	**0.12**	**0.08**			

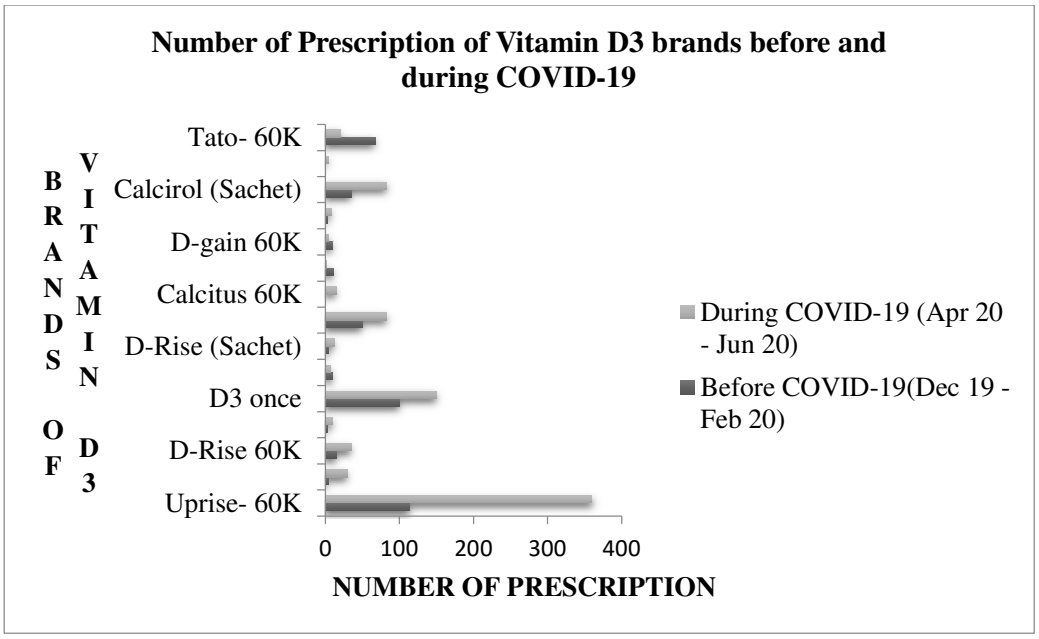
Source: https://doi.org/10.1101/2020.06.24.20138644, Data retrieved June 14, 2020

INTERPRETATION

1. The above Table 1 shows that authors have referred the Vitamin 25(OH) D levels in the general adult population in some European countries for the last ten years for both genders/ ages 40-65 as compiled in 2019 by ECTS statement in the European Journal of Endocrinology and the country data about COVID-19 on mortality rates per million from COVID-19 in European countries from John Hopkins University of Medicine Resources center through four data retrievals between May 11, 2020, and June 14, 2020. For the demographics 2020 country data, the CIA World Factbook has been used.
2. The above Table 1 shows significant results that severe Vitamin D deficiency is strongly and significantly correlated with COVID-19 deaths per million population with r = 0.76, p = 0.01 at a 95 percent confidence interval. Similar findings have been noted and hypothesized in the Indian population for COVID-19, as cited earlier above by Padhi, S, et al. (2020)
3. While, the prevalence of mild Vitamin D deficiency is moderately correlated with COVID 19 deaths per million with r = 0.52, p = 0.12. However, this correlation does not reach statistical significance. For the mean Vitamin D levels, they are inversely correlated with the COVID-19 deaths per million with r = -0.57, p = 0.08.
4. Since the correlation coefficient r = 0.76, it means that the death rate from COVID-19 can be explained by the prevalence of severe Vitamin D deficiency. This finding by itself does not necessarily mean that low Vitamin D levels increase the death rate or that correcting

Vitamin D levels would decrease the mortality because another variable could cause both a high prevalence of Vitamin D deficiency and increased COVID-19 deaths. Examples of such variables could be an inadequate healthcare system or the prevalence of unknown genetic variation.

Figure 2: Prescription of vitamin D3 brands before and during COVID-19

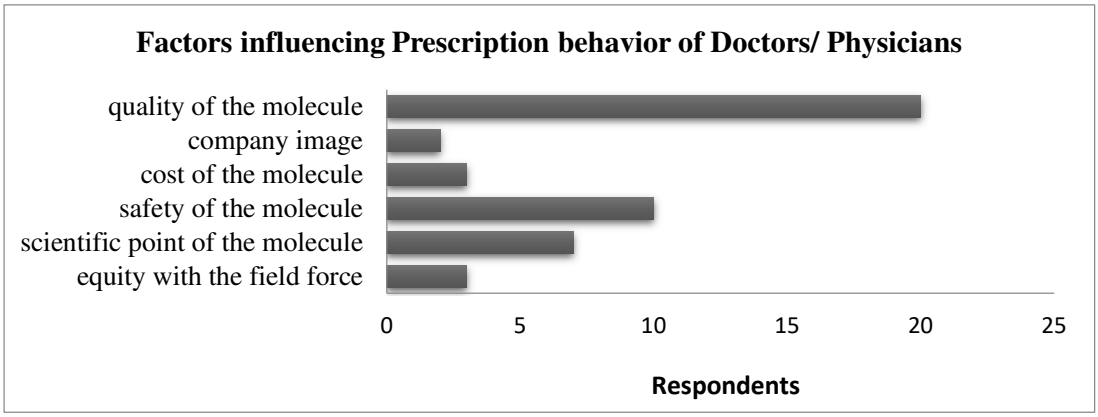


Source: Researchers survey

INTERPRETATION

1. The above graph shows the increase in Vitamin D3 brands' prescriptions before COVID-19 (Dec19-Feb20) and during COVID-19 (Apr20-Jun20).
2. It shows that before the COVID-19, prescriptions of Vitamin D3 brands were less than during the COVID-19 situation.
3. It also shows that Uprise-60K is the leading brand of Vitamin D3 in this pandemic situation.

Figure 3: Prescription behavior of Doctors/Physicians

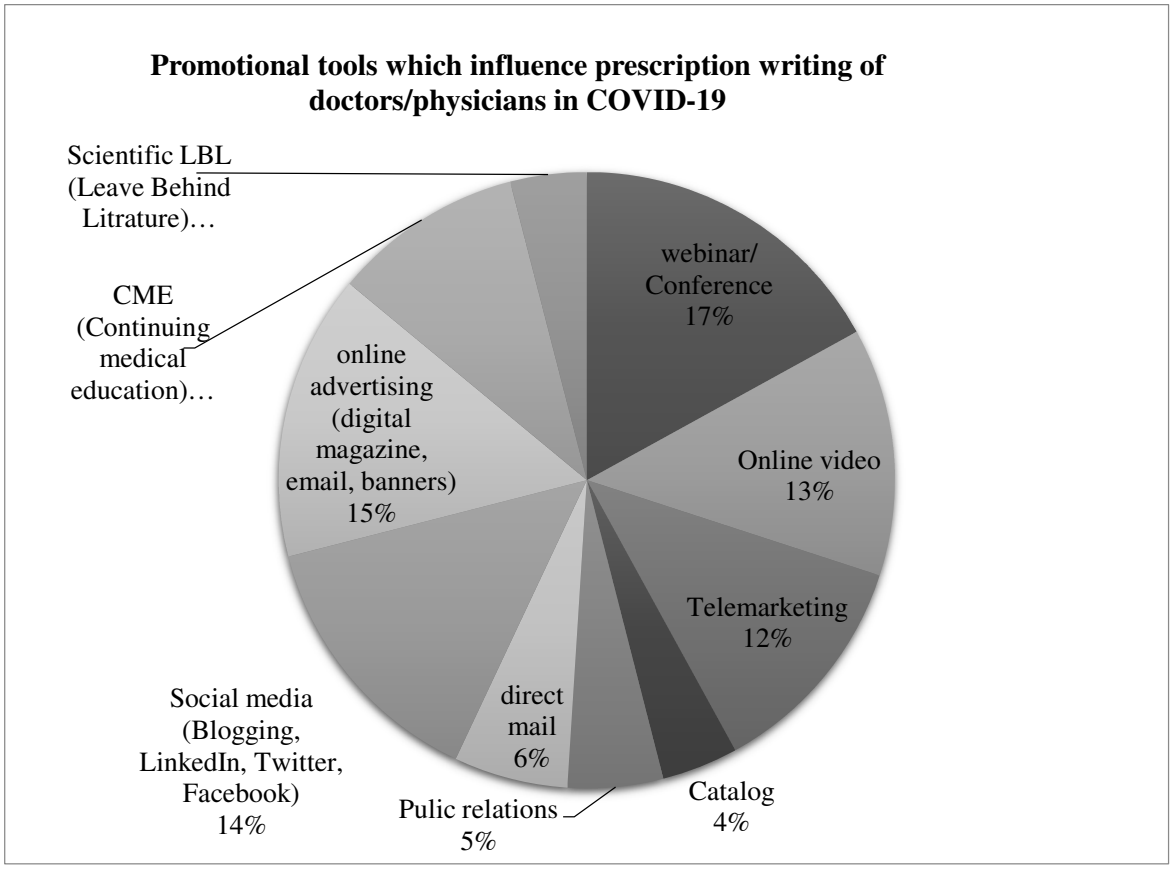


Source: Researchers survey; Sample size: 25 doctors

INTERPRETATION

1. The above graph shows the attributes or factors that influence the prescribing behavior of physicians/doctors.
2. The graph shows that the molecules' major factors, quality, and safety, largely influence the physician/doctors' prescription writing.

Figure 4: Promotional tools that influence prescription writing of doctors/physicians in COVID-19 pandemic



Source: Researchers survey

INTERPRETATION

1. The above pie-chart shows the promotional tools which influence prescription writing of doctors in the COVID-19 pandemic situation.
2. It shows that promotional tools adopted by the sales force team of pharmaceutical companies nowadays have changed and transformed, as physical interaction between physicians/doctors is avoided due to the COVID-19 situation.
3. Researchers found that nowadays, there is a more digital media approach. The Pie-chart shows that digital channels like webinars/conferences, online advertisements (digital magazines, banners, and emails), social media (LinkedIn, Twitter, and Facebook), telemarketing, and online videos (of Mechanism of action) largely influences prescription writing of doctor's in COVID-19 pandemic situation.

CONCLUSION

Thus, we summarize and conclude, corresponding to each of the objectives:

1. The study has explained the direct impact of COVID-19 on Indian pharmaceutical markets' vitamin segments. It was concluded that vitamins per unit sales or vitamins' consumption has increased during this pandemic situation of COVID-19.
2. Significantly and strongly prevalence of severe Vitamin D deficiency with the death rate per million people due to COVID-19 is correlated. This has been observed in different European countries and hypothesized in the Indian population too. Moreover, the consumption of Vitamin D3 rose from the past months. It is wise for suppliers, manufacturers, and retailers of vitamins to begin preparing now for the future market where demand for vitamins by consumers continues to grow beyond its historical aspects. Furthermore, it contributes to capturing the market demand for vitamins in the present and future.
3. The quality and the safety of the drug molecule are the primary attributes that are majorly important and influence physicians/doctors for prescribing.
4. The promotional tools adopted by the sales force team of pharmaceutical companies nowadays have changed, as physical interaction between physicians/doctors is avoided due to the COVID-19 situation. It was found that currently, the companies have adopted more digital media approach. Digital channels like webinars/conferences, online advertisements (digital magazine, banners, and emails), social media (LinkedIn, Twitter, and Facebook), telemarketing, and online videos (MOA) largely influence prescription writing of doctors in the COVID-19 pandemic situation.

LIMITATIONS

1. The study was conducted in the Prayagraj district (Uttar Pradesh) region only; perhaps a wider sample base could have been taken so that the results could have been more generalized. The sample size could have been larger.
2. Not all respondents have responded, so the study cannot give 100 percent accurate results.
3. Some of the Doctors/ Physicians and retail Chemists were reluctant to have communication so that the response could be a bit biased.

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