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Assessment of Self-Medication Pattern During Outbreak of Coronavirus Disease in Himachal Pradesh, a Northwestern Himalayan Region of India

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ABSTRACT

Background: Self-medication (SM) is a major global health issue, especially in low- and middle-income countries with limited healthcare access. During Coronavirus disease, fear, misinformation, and restricted services worsened the problem. This study examined SM prevalence, patterns, and determinants in Himachal Pradesh, India.

Purpose: This research aimed to determine the prevalence, pattern, and awareness of self-medication (SM) during the Coronavirus disease outbreak in the general public when no preventive or curative therapy was available.

Methods: A descriptive cross-sectional, web-based survey was carried out from January to May 2021 using a pre-validated questionnaire distributed via social media platforms. Owing to pandemic-related constraints, convenience sampling was employed. Eligible participants were residents of Himachal Pradesh aged ≥18 years who provided informed consent. Respondents with incomplete submissions or reporting multiple drug use for unrelated conditions were excluded. Of 654 initial responses, 527 met the criteria for analysis. Descriptive statistics summarized demographic and clinical data, and chi-square tests assessed associations between categorical variables.

Results: Among the 527 respondents, 48.5% were male and 51.5% female; nearly half (48.5%) were aged 25–35 years. Fever (30.4%) was the most frequently reported reason for SM, followed by sore throat (19.4%) and weakness (16.7%). Commonly self-administered medicines included paracetamol (33.6%), azithromycin (21.8%), and doxycycline (14.6%). Only 24% reported obtaining medicines on a physician's advice, while pharmacies and personal networks were predominant information sources. Chi-square analysis revealed a statistically significant association between education level and drug choice ($p < 0.05$). Notably, 85% of participants were unaware of the risks of overdose or adverse effects.

Conclusion: The study concludes that 24% of respondents took medication on a physician's advice, while the remaining 76% sought SM. Inappropriate self-medication might result in irrational treatment and serious health issues. Therefore, there is an urgent need to monitor and manage SM-related practices. SM was widely practiced in Himachal Pradesh during the Coronavirus disease pandemic, driven by limited healthcare availability and misinformation. Targeted public health education, stricter regulation of over-the-counter drug sales, and community-level awareness initiatives are essential to address this issue.

1. Introduction

In the present scenario of medicinal practices and health offerings, taking medicine without a prescription has become a common practice globally, especially in poor and developing nations (Chouhan & Prasad, 2016). The World Health Organization (WHO) defines self-medication (SM) as the use of pharmaceuticals for self-treatment, including over-the-counter (OTC) medications for mild ailments, without medical advice or consultation for diagnosis, prescription, or therapy monitoring (World Health Organization [WHO], 2000).

Several reasons compel people to opt for SM, such as the impulse to self-care, inadequate time or hectic lifestyle,

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financial pressure, unawareness, misconception, illiteracy, and unprofessional drug distribution (Yousef *et al.*, 2008). During the COVID-19 pandemic, there has been a pressing need to cope with equally dangerous trends like the spread of counterfeit drugs, fake news, and misinformation about medications (Erku *et al.*, 2021). Public interest in seeking self-medication information online has significantly increased during this time (Onchonga, 2020).

For instance, during the pandemic, internet sources and media cultivated a public perception about the efficacy of chloroquine (CQ) and hydroxychloroquine (HCQ), disregarding the serious adverse effects and drug-drug interaction potentials of these medications (Mallhi *et al.*, 2021). Notably, the combination of hydroxychloroquine and azithromycin may result in additive or synergistic toxicity or pharmacokinetic interactions when used alongside other therapies (Hache *et al.*, 2021). Another example is ivermectin, available OTC in several countries, which has been associated with neurological toxicity when misused for COVID-19 treatment (Farah *et al.*, 2022).

Dexamethasone, labeled as a lifesaving drug by UK researchers for critically ill COVID-19 patients to suppress hyperimmune responses and prevent acute respiratory distress syndrome (ARDS), was later advised by the UK National Health Services to be restricted only to such critical cases due to its adverse effects (Johnson & Vinetz, 2020). As a result, WHO issued multiple cautionary statements regarding self-medication practices during the COVID-19 pandemic (WHO, 2020).

In developing nations like India, access to OTC medicines is more liberal due to weak enforcement of medical regulations, in contrast to developed nations (Marathe *et al.*, 2020). Specifically, in Himachal Pradesh, the availability of healthcare services is constrained due to geographical barriers, tribal and hilly terrains, uneven population distribution, and socio-economic and political factors (Dhadwal & Bhutani, 2017). Therefore, there is a crucial need for the strategic expansion and enhancement of healthcare facilities in the state.

The therapeutic effects and potential side effects of various self-medicated drugs are summarized in Table 1, based on insights from recent literature (Nasir *et al.*, 2020; Ayosanmi *et al.*, 2022). Thus, this study aims to assess the knowledge, prevalence, and patterns of self-medication and self-treatment practices among the population of Himachal Pradesh, a northwestern Himalayan region in India.

Table 1: List of Possible Side Effects of Some Anti-Infective Agents Used in Self-Medication During COVID-19 (Nasir *et al.*, 2020; Ayosanmi *et al.*, 2022)

Drug	Therapeutic Use	Severe / Rare Side Effects	Mild / Common Side Effects
Azithromycin	Used to treat bacterial infections such as bronchitis, pneumonia, and infections of the ears, lungs, sinuses, skin, and reproductive organs. Also used for serious infections such as mycobacterial infections (MAC).	Prolonged QT interval, arrhythmia, hepatic dysfunction, exacerbation of myasthenia gravis.	Diarrhea, nausea, abdominal pain, vomiting, headache.
Doxycycline	Used to treat bacterial infections including pneumonia and other respiratory tract infections, as well as infections of the eyes, skin, lymphatic system, intestines, and genitals. Also treats infections spread by ticks, lice, mites, infected animals, or contaminated food or water.	Severe headache, blurred or double vision, vision loss, esophageal irritation, anemia, pancreatitis, severe abdominal pain, fever, skin reactions (e.g., blisters, peeling skin), petechiae (small purple spots).	Loss of appetite, nausea, vomiting, diarrhea, rash, photosensitivity, hives, tooth discoloration, bloody diarrhea, abdominal cramps, fever, dehydration, weight loss.
Hydroxychloroquine	Approved for the prevention and treatment of malaria. Also used to treat autoimmune diseases such as chronic discoid lupus erythematosus, systemic lupus erythematosus, and rheumatoid arthritis.	Bone marrow suppression (e.g., anemia, aplastic anemia, agranulocytosis, leukopenia, thrombocytopenia), hemolysis in G6PD-deficient individuals, cardiomyopathy, heart failure, QT prolongation, ventricular arrhythmias, torsades de pointes.	Nausea, vomiting, abdominal cramps, appetite loss, weight loss, diarrhea, dizziness, vertigo, headache, tinnitus, mood changes, nervousness, irritability, skin rash, itching, hair loss.

Drug	Therapeutic Use	Severe / Rare Side Effects	Mild / Common Side Effects
Ibuprofen	Used to relieve pain from various conditions such as headache, dental pain, menstrual cramps, muscle aches, or arthritis. Also used to reduce fever. Classified as a nonsteroidal anti-inflammatory drug (NSAID).	Fluid retention, ankle swelling, blurred vision, eye irritation, upper gastrointestinal ulcers.	Nausea, vomiting, stomach pain, fatigue, drowsiness, tinnitus.
Paracetamol	Used for the relief of mild to moderate pain such as headache, muscle aches, minor arthritis pain, and toothache. Also used to reduce fever.	Hematuria (bloody or cloudy urine), petechiae (red dots on the skin), jaundice (yellowing of the eyes or skin).	Nausea, vomiting, anemia, postoperative bleeding.

2. Methods

2.1. Data Collection

This descriptive, cross-sectional study was conducted to evaluate awareness, prevalence, and patterns of self-medication (SM) during the COVID-19 pandemic in Himachal Pradesh, India. Data were collected between January and May 2021, during the peak of the second COVID-19 wave. Due to travel restrictions and safety concerns, community-based field surveys were not feasible; therefore, data were gathered online using convenience sampling.

A structured, pre-validated questionnaire was created in Google Forms and disseminated through social media platforms, including WhatsApp, Facebook, and email. The first section of the form explained the study objectives, procedures, voluntary nature of participation, and assurances of anonymity and confidentiality.

- **Sample Size Determination:** The sample size was calculated using an estimated SM prevalence of 50% from prior pandemic-related studies, a 95% confidence level, and a 5% margin of error, giving a minimum target of 384 participants. To account for possible exclusions due to incomplete or invalid responses, an oversampling approach was used, recruiting a total of 654 participants.
- **Eligibility Criteria**
  - **Inclusion criteria:** Residents of Himachal Pradesh aged ≥18 years, able to understand the questionnaire, and willing to participate.
  - **Exclusion criteria:** Respondents who reported multiple drug use for unrelated conditions, provided incomplete data, or were not residents of Himachal Pradesh. After applying the criteria, 127 responses were excluded, resulting in 527 valid responses for analysis.
- **Ethical Considerations:** As the study involved no clinical interventions, did not collect identifiable personal or sensitive health data, and relied solely on voluntary participation via an anonymous questionnaire, formal ethical clearance was not required. Informed consent was obtained electronically from all participants before data submission, ensuring that participation was entirely voluntary and based on willingness.
- **Questionnaire Development and Validation:** The questionnaire included items on socio-demographics, sources of drug advice, symptoms prompting SM, and types of medicines used as shown in Table 2. Face and content validity were assessed by a panel of experts comprising hospital pharmacists, public health physicians, pharmacology faculty, and social statisticians. The panel evaluated the questionnaire for clarity, relevance, and comprehensiveness, and modifications were made to remove ambiguity and redundancy.

Although face validity assessments are often conducted in person, studies indicate that standardized, expert-reviewed online questionnaires can achieve comparable validity to paper-based formats (Rahman *et al*., 2021; Regmi *et al*., 2016).

Table 2: Questionnaire

1	City/town where you live in Himachal
2	Sex
3	Age
4	Marital Status
5	Education level
6	Do you currently work (If yes, indicate the industry)?
7	Have you ever used self-medication during the COVID-19 pandemic?

8	You have taken self-medication on what symptoms?
9	Indicate if you used any of these drugs during the COVID-19
10	Show the motivation behind why you utilized the medications you did during the COVID-19
11	Do you know the hazards of overdosage?

2.2. Data Analysis

Data from completed questionnaires were exported from Google Forms into Microsoft Excel for initial organization and cleaning. Descriptive statistics, including frequencies and percentages, were applied to summarize socio-demographic details, reported symptoms, and patterns of self-medication.

Inferential statistics were conducted using IBM SPSS Statistics (version 25.0). The chi-square (χ^2) test was employed to examine associations between categorical variables such as education level, gender, and type of drug used. A p-value of <0.05 was considered statistically significant.

3. Results

The online survey was disseminated through social media platforms,and received654 responses. Following eligibility and quality checks, 127 responses were excluded (incomplete responses or reporting multiple unrelated drugs),the final survey included 527 legitimate individuals.

3.1. Socio-Demographic Characteristics of Respondents

Of the 527 participants, 256 (48.5%) were male and 271 (51.5%) were female. The most common age group was 25–35 years (n = 256; 48.5%, 95% CI: 44.3–52.8%), followed by 17–25 years (n = 165; 31.3%, 95% CI: 27.4–35.4%). Over half of the respondents (n = 290; 55.0%) had completed a bachelor's degree, while 102 (19.4%) held postgraduate qualifications. A total of 185 (35.1%) were students, and 56 (10.6%) were employed in healthcare facilities. Other demographic characteristics are shown in Table 3.

Table 3: Socio-Demographic Characteristics of Respondents (N = 527)

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	256	48.5%
Female	271	51.5%
Age group (years)		
17-25	165	31.3%
25-35	256	48.5%
35 -50	106	20.1%
Relationship Status		
Single	321	60.9%
Married	201	38.1%
Divorced	5	1.0%
Education level		
School	81	15.4%
Bachelors	290	55.0%
Postgraduate	102	19.4%
Associates degree	54	10.2%
Work status		
Education (Students)	185	35.1%
Self-employed/ business	72	13.6%
Healthcare worker	56	10.6%
Housekeeper	55	10.4%
Civil services	45	8.5%
Unemployed	114	21.6%

3.2. Sources of Drug Advice

Our study indicated that only 127 respondents (24.1%, 95% CI: 20.6–27.9%) took medication on a doctor's advice, while the remaining 400 (76.0%, 95% CI: 72.1–79.4%) opted for "self-medication" through other non-medical sources such as friends/family, pharmacies without prescriptions, and media/internet. The majority of the sources were pharmacies without prescriptions, where anybody could acquire drugs without any restrictions due to the country's lax regulatory standards. The source of drug advice among respondents (n = 527). Percentages based on total responses, with multiple sources allowed, are depicted in Figure 1.

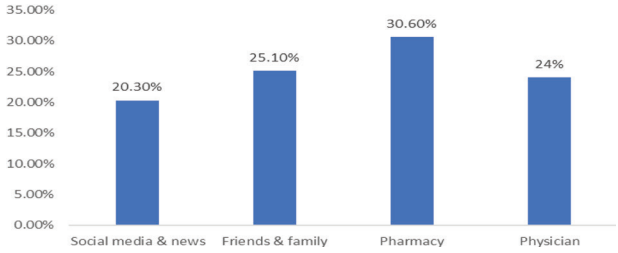
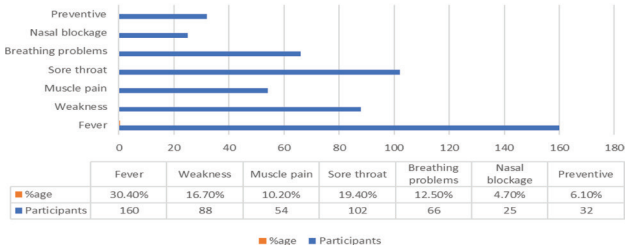


Figure 1: Source of Drug Advice

3.3. Reason for Self-Medication Practice According to Symptoms

Respondents most frequently reported fever (n = 160; 30.4%, 95% CI: 26.6–34.4%), followed by sore throat (n = 102; 19.4%), weakness (n = 88; 16.7%), breathing problems (n = 66; 12.5%), and muscle pain (n = 54; 10.2%). A smaller proportion (n = 32; 6.1%) reported taking drugs as a preventive measure against COVID-19. Multiple symptoms could be reported. Respondents (n = 527) reported symptoms that prompted them to self-medicate. Percentages may exceed 100% due to multiple symptoms reported per participant and are depicted in Figure 2.

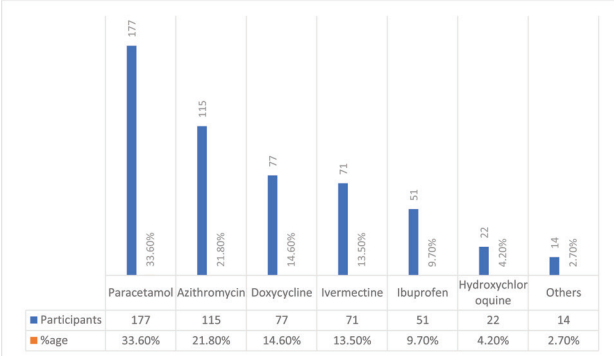


	Fever	Weakness	Muscle pain	Sore throat	Breathing problems	Nasal blockage	Preventive
%age	30.40%	16.70%	10.20%	19.40%	12.50%	4.70%	6.10%
Participants	160	88	54	102	66	25	32

Figure 2: Medication according to Symptoms

3.4. Distribution of Commonly Used Drugs as Self-Medication

Respondents who used SM were further questioned about their medicines. We observed that among drugs reported for single conditions, paracetamol was most common (n = 177; 33.6%, 95% CI: 29.8–37.6%), followed by azithromycin (n = 115; 21.8%), doxycycline (n = 77; 14.6%), and ivermectin (n = 71; 13.5%). Analgesics such as ibuprofen were used by 51 respondents (9.7%). Hydroxychloroquine was reported by 22 participants (4.2%), and small numbers reported aspirin, amoxicillin, montelukast, or levocetirizine (n = 14; 2.7%). Multiple drugs were not counted for any single respondent in this analysis. Commonly used self-medication drugs during COVID-19 among respondents (n = 527). Only single-drug users were included in the analysis. are depicted in Figure 3.



	Paracetamol	Azithromycin	Doxycycline	Ivermectine	Ibuprofen	Hydroxychloroquine	Others
Participants	177	115	77	71	51	22	14
%age	33.60%	21.80%	14.60%	13.50%	9.70%	4.20%	2.70%

Figure 3: Commonly Used Drug as Self-medication in COVID-19

4. Discussion

Self-medication (SM) remains a significant public health concern, particularly in contexts where healthcare access is restricted (Chouhan & Prasad, 2016; World Health Organization, 2000). In this study, conducted in Himachal Pradesh during the second wave of COVID-19, a high prevalence of SM was observed, with the majority of respondents relying on pharmacies, family, or media sources instead of consulting healthcare professionals. The challenging geography of the North Western Himalayan region, coupled with uneven distribution of medical facilities, likely amplified reliance on SM (Dhadwal & Bhutani, 2017).

The most common symptoms prompting SM—fever, sore throat, weakness, and muscle pain—mirror findings from similar studies conducted during the pandemic in other regions of India (Ayosanmi *et al.*, 2022) and abroad (Yasmin *et al.*, 2022; Quispe-Cañari *et al.*, 2021). Fever was consistently the leading reason for SM, with paracetamol being the most commonly used drug, followed by azithromycin and doxycycline. This pattern reflects both perceived drug safety and widespread misinformation about COVID-19 treatments (Ayosanmi *et al.*, 2022; Hache *et al.*, 2021). Notably, 6.1% of respondents reported taking medicines preventively despite having no symptoms, indicating the influence of misinformation and pandemic-related fear (Erku *et al.*, 2021).

4.1. Comparison with Other Studies

Our results are consistent with reports from other low- and middle-income countries (LMICs) where SM prevalence during COVID-19 ranged from 32.5% to over 80% (Amuzie *et al.*, 2022). For example, a multicountry review found paracetamol (65.2%) and multivitamins (56%) among the most frequently self-administered agents (Ayosanmi *et al.*, 2022). Another large-scale study reported similar drug patterns—paracetamol, ibuprofen, azithromycin, and hydroxychloroquine—with colds and flu as leading triggers for SM (Yasmin *et al.*, 2022).

Sources of advice in those studies also closely matched our findings, with family members, friends, and internet resources dominating (Quispe-Cañari *et al.*, 2021).

4.2. Exclusion of Multi-drug Users

To ensure accurate attribution of drug use to specific symptoms, we excluded respondents reporting multiple unrelated drugs. This methodological choice reduces misclassification bias, as including such cases would complicate interpretation of drug-symptom relationships. Although this approach may slightly underestimate total SM diversity, it aligns with best practices in similar prevalence studies (Mallhi *et al.*, 2021; Hache *et al.*, 2021).

4.3. Awareness and Risks

A concerning finding was that 85% of respondents lacked awareness of overdose risks or potential adverse effects—an observation echoed in similar national studies (Ayosanmi *et al.*, 2022; Yasmin *et al.*, 2022; Quispe-Cañari *et al.*, 2021). Such gaps highlight the urgent need for structured public health messaging on rational drug use.

4.4. Biases and Limitations

The web-based convenience sampling may have overrepresented younger, more educated, and urban populations, introducing selection bias (Onchonga, 2020). Self-reported data may also be affected by recall bias. Excluding multi-drug users, while methodologically justified, limits generalizability to the broader population where polypharmacy is common.

4.5. Policy Implications

In hilly and tribal regions like Himachal Pradesh, healthcare delivery is challenged by difficult terrain, poor transport links, and uneven medical staffing. Targeted interventions—such as telemedicine expansion, stricter OTC regulation, pharmacist training, and localized awareness campaigns—are essential. Embedding SM education into community health worker programs could further reduce inappropriate medicine use in remote areas (Dhadwal & Bhutani, 2017; Malik *et al.*, 2020).

Overall, our findings reinforce that SM is not only a pandemic-driven behavior but also a long-standing practice intensified by crisis conditions. Without targeted policies, the irrational use of medicines will continue to contribute to adverse events, antimicrobial resistance, and unnecessary healthcare costs.

5. Conclusion

Self-medication has become a vital healthcare aspect, especially during the COVID-19 pandemic, and a global challenge. In our study, only 24% of people took prescription medication, while 76% took self-medication through other sources. The most commonly sought self-medication was paracetamol (33.6%), and fever was the most prevalent symptom (30.4%).

Countering it with effective interventions would include proper counseling, public health education, and stringent laws on drug advertising and supply. There is an urgent need to monitor and manage self-medication-related practices by enforcing strong laws and involving health professionals and policymakers.

Abbreviations

SM: Self-medication, **OTC:** Over-the-counter, **CQ:** Chloroquine, **HCQ:** Hydroxychloroquine, **PHC:** Primary Health Centre, **COVID-19:** Coronavirus Disease 2019

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Authorship Contribution

Raveen Chauhan: Writing the first draft of the manuscript, designing and writing the questionnaire; Swati Pundir: Revising the manuscript and organizing data; Naresh Vashist: Statistical analysis; Chirag Dhawan: Data collection and acquisition; Arun Parashar: Data interpretation and analysis; Ranjan Kumar: Survey execution and manuscript editing.

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Ethical Approval

Ethical approval was not required for this cross-sectional survey study as data were collected via Google Forms with participants' informed consent.

Declaration

It is an original article and has neither been sent elsewhere nor published anywhere.

Conflict of Interest

The authors declare no conflict of interest.

References

Amuzie, C. I., Kalu, K. U., Izuka, M., Nwamoh, U. N., Emma-Ukaegbu, U., Odini, F., Metu, K., Ozurumba, C., & Okedo-Alex, I. N. (2022). Prevalence, pattern and predictors of self-medication for COVID-19 among residents in Umuahia, Abia State, Southeast Nigeria: Policy and public health implications. *Journal of Pharmaceutical Policy and Practice, 15*(1), 1–9. https://doi.org/10.1186/s40545-022-00451-w

Ayosanmi, O. S., Alli, B. Y., Akingbule, O. A., Alaga, A. H., Perepelkin, J., Marjorie, D., Sansgiry, S. S., & Taylor, J. (2022). Prevalence and correlates of self-medication practices for prevention and treatment of COVID-19: A systematic review. *Antibiotics, 11*(6), 808. https://doi.org/10.3390/antibiotics11060808

Chouhan, K. I., & Prasad, S. B. (2016). Self-medication and their consequences: A challenge to health professional. *Asian Journal of Pharmaceutical and Clinical Research, 9*(2), 314–317. https://journals.innovareacademics.in/index.php/ajpcr/article/view/10675

Dhadwal, S., & Bhutani, S. (2017). Availability of health services in Himachal Pradesh. *International Journal of Advanced Research and Development, 2*(6), 231–238.

Erku, D. A., Belachew, S. A., Abrha, S., Sinnollareddy, M., Thomas, J., Steadman, K. J., & Tesfaye, W. H. (2021). When fear and misinformation go viral: Pharmacists' role in deterring medication misinformation during the 'infodemic' surrounding COVID-19. *Research in Social and Administrative Pharmacy, 17*(1), 1954–1963. https://doi.org/10.1016/j.sapharm.2020.04.032

Farah, R., Kazzi, Z., Brent, J., Burkhart, K., Wax, P., Aldy, K., & Toxicology Investigators Consortium FACT Study Group. (2022). Ivermectin associated adverse events in the treatment and prevention of COVID-19 reported to the FACT pharmacovigilance project. *Clinical Toxicology, 60*(8), 942–946. https://doi.org/10.1080/15563650.2022.2051569

Hache, G., Rolain, J. M., Gautret, P., Deharo, J. C., Brouqui, P., Raoult, D., & Honoré, S. (2021). Combination of hydroxychloroquine plus azithromycin as potential treatment for COVID-19 patients: Safety profile, drug interactions, and management of toxicity. *Microbial Drug Resistance, 27*(3), 281–290. https://doi.org/10.1089/mdr.2020.0349

Johnson, R. M., & Vinetz, J. M. (2020). Dexamethasone in the management of COVID-19. *BMJ, 370*, m2648. https://doi.org/10.1136/bmj.m2648

Malik, M., Tahir, M. J., Jabbar, R., Ahmed, A., & Hussain, R. (2020). Self-medication during COVID-19 pandemic: Challenges and opportunities. *Drugs & Therapy Perspectives, 36*, 565–567. https://doi.org/10.1007/s40267-020-00785-z

Mallhi, T. H., Khan, Y. H., Alotaibi, N. H., Alzarea, A. I., Alanazi, A. S., Qasim, S., Iqbal, M. S., & Tanveer, N. (2021). Drug repurposing for COVID-19: A potential threat of self-medication and controlling measures. *Postgraduate Medical Journal, 97*(1153), 742–743. https://doi.org/10.1136/postgradmedj-2020-138447

Marathe, P. A., Kamat, S. K., Tripathi, R. K., Raut, S. B., & Khatri, N. P. (2020). Over-the-counter medicines: Global perspective and Indian scenario. *Journal of Postgraduate Medicine, 66*(1), 28–34. https://doi.org/10.4103/jpgm.JPGM_163_19

Nasir, M., Mannan, M., Salauddin Chowdhury, A. S. M., Zahan, T., & Perveen, R. A. (n.d.). Prevalence, pattern and impact of self-medication of anti-infective agents during COVID-19 outbreak in Dhaka City.

Onchonga, D. (2020). A Google Trends study on the interest in self-medication during the 2019 novel coronavirus (COVID-19) disease pandemic. *Saudi Pharmaceutical Journal, 28*(7), 903–904. https://doi.org/10.1016/j.jsps.2020.06.007

Quispe-Cañari, J. F., Fidel-Rosales, E., Manrique, D., Mascaró-Zan, J., Huamán-Castillón, K. M., Chamorro–Espinoza, S. E., Garayar–Peceros, H., Ponce–López, V. L., Sifuentes-Rosales, J., Alvarez-Risco, A., & Yáñez, J. A. (2021). Self-medication practices during the COVID-19 pandemic among the adult population in Peru: A cross-sectional survey. *Saudi Pharmaceutical Journal, 29*(1), 1–11. https://doi.org/10.1016/j.jsps.2020.12.001

World Health Organization. (2000). *Guidelines for the regulatory assessment of medicinal products for use in self-medication*. https://apps.who.int/iris/bitstream/handle/10665/66154/WHO_EDM_QSM_00.1_eng.pdf

World Health Organization. (2020). *Coronavirus disease (COVID-19) advice for the public: MythBusters*. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/mythbusters

Yasmin, F., Asghar, M. S., Naeem, U., Najeeb, H., Nauman, H., Ahsan, M. N., & Khattak, A. K. (2022). Self-medication practices in medical students during the COVID-19 pandemic: A cross-sectional analysis. *Frontiers in Public Health, 10*, 803937. https://doi.org/10.3389/fpubh.2022.803937

Yousef, A. M., Al-Bakri, A. G., Bustanji, Y., & Wazaify, M. (2008). Self-medication patterns in Amman, Jordan. *Pharmacy World & Science, 30*(1), 24–30. https://doi.org/10.1007/s11096-007-9135-x