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Original Research

Exploring the Impact of COVID-19 on Migraine-Related Medications Expenditure and Predictors of Economic Burden

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Abstract

Objective: The aim of the study was to investigate how COVID 19 impacted the spending on medications that are used to relieve migraine. Another aim of this study was to assess the significant predictors which contributed to increasing the economic burden (EB)among patients with migraine. **Methods:** A cross-sectional study was conducted on patients with migraine between October 2022 and April 2023 using a predeveloped self-administrative questionnaire. All patients who had a migraine, aged 18 and more and can spoke Arabic were included using convenient sampling procedure. The economic burden (EB) model was developed using simple and multiple regression. **Results:** After removing samples with extreme value, a total of 198 responses were analyzed. When adjusted for confounding patients age, education level, occupation and level of income were the significant predictors for EB. Older patients' (AOR: 1.82, p<0.05), low educated (AOR: 3.17, p<0.05), employed (AOR: 1.07, p<0.05) and high-income level patients' (AOR: 2.46, p<0.05) were more likely to experienced EB than their counterparts. **Conclusion:** The current study provided an initial picture about the economic burden of COVID 19 on the spending of medications and the number of ER visits from the migraineurs' perspectives. Patients' age, education level, occupation and level of income were significant predictors of increasing the economic burden on patients with migraine. Most of the migraine patients avoided going to hospital and preferred to take medications at their homes. More research should warrant focusing on estimating the total migraine cost including direct, indirect, and intangible cost.

Keywords: Migraine, COVID 19, Economic Burden, Saudi Arabia, Regression analysis

INTRODUCTION

Migraine is unilateral headache that most often starts at teens, and it is more prevalent in women[1]. It is listed as one of disabling disease and usually accompanied with different symptoms including nausea, vomiting, poor muscle coordination, slurred speech, extreme sensitivity to light and sound, severe throbbing pain or a pulsing sensation that might lasting for hours to days, and the pain can have negative impact on the daily activities and work of migraineurs[1,2]. The impact of COVID-19 has been significant across various aspects. In terms of public health, it has resulted in a global health crisis[3]. The economic impact of COVID 19 has been substantial especially, on patients with chronic diseases including migraine can be significant for those of people who use their income to access health care services and buy medications[1,4]. The economic burden of migraine diseases can be significant due to some factors including direct and indirect cost. Direct medical and non-medical cost including emergency medical visits and pharmaceuticals prescription to buy medication, while indirect cost of migraineurs could be loses productivity at work due to unalterable pain of migraine which might be led to a cut of individuals salary[5].

In the United States, the direct health care cost was estimated to be around $11 billion a year, and the total indirect cost around $11 billion a year[6]. A national study that was conducted to estimate the economic burden of COVID 19 found that there has been an increase in spending in health care services in Saudi Arabia[7]. The total cost of all direct medical services for patients hospitalized with COVID-19 was US$ 51,572,393.4[8]. However, in some countries, it was noticed that there has been a significant reduction in health care spending by roughly $150 billion, as compared to the years before starting the pandemic. This drop is equal to roughly 5% of personal medical spending. Although direct health care spending increased in the first 6 months of 2021, it did not reach to the level that was before COVID 19[9].

The economic impact of COVID 19 was clearly seen not only in spending on medications but also it impacted their visits physicians and hospitals[4,8]. Spending on prescription drugs has been heavily influenced due to COVID 19[4]. In 2020 there was a moderate increase at the rate of 5% in the spending on medications in US. Furthermore, it has been reported that spending on medication was increases 13%[4].

A recent meta-analysis reported that estimated prevalence of migraines in Saudi Arabia, as indicated by the pooled proportion of 0.225617 (95% CI: 0.172749 to 0.28326), is concerning due to its relatively high level[10]. Currently, there is a lack of research to provide an idea on the health economic impact of COVID

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19 on migraineurs. The goal of this analysis was to assess the impact of COVID 19 pandemic on spending on medications that are used to treat migraine including pain killers and others using migraineurs' perspective. Another aim of this study was to evaluate the predictors which might contribute to increasing the economic burden of patients with migraine.

METHODS

Study design, settings, and participants eligibility criteria. A semi structured questionnaire-based cross-sectional survey was conducted for 6 months duration during October 2022 and April 2023 .The study was approved by the Institutional Review Board and the Ethical Committee at Imam Abdulrahman bin Faisal University (IRB-2022-05-228). The validated pre-developed self-administered questionnaire was used for data collection. Adults male and female migraine patients who registered and receive treatment at least six months in the migraine clinic at the KFHU were recruited after giving verbal consent. Patients who were at the center for any reason other than migraine, receive treatment less than six months and who did not consent were excluded.

Data collection procedure

Convenience sampling method was used to gather the samples due to assemble maximum possible number of responses. The data were collected from the participants who visited community pharmacies and also the data were gathered using an online survey link which was shared through a number of social media platforms (I messages, WhatsApp, Telegram and X), in both Arabic and English language . The survey was anonymous to ensure there was no personally identifiable information of the individuals.

Research instruments

Based on the literature, a semi- structured self-administered questionnaire was developed by the principal investigator (1,7,8). To ensure content validity the questionnaire was reviewed by the co investigators who were subjective and methodology experts. The questionnaire was subsequently pretested among 30 students from the college of clinical pharmacy. The feedback and comments from the students were addressed and the change and adjustment to the questioner was subsequently made, and samples were not included in the final analysis. Apart from socio-demographic information, questions on migraines were included: when you were first diagnosed with migraine? and how many attacks each week? Also, a few questions about the COVID 19 were included. Questions related to economic impact included for example, whether the percentage of spending of medication of migraine was increased or decreased. In addition, whether the number of visits to hospitals increased or decreased.

Outcome variable measurement

Economic Burden (EB) of COVID 19 due to spending on medications and the number of visits to emergency room and/ or clinics to treat migraine during COVID 19 for patients with migraine was the main outcome variables. Changing in number of visits might give indication about direct non-medical cost such as cost of transportation to hospital, cost of babysitter and cost of the food etc. The outcomes were measured using three questions with different responses. First question included: i) 'Have COVID 19 impacted your spending of migraine and pain killer medications?' with responses; not at all, slight effect, moderate effect, and severe effect. While second question was 'average % in change in spending of migraine and pain killer medications', had seven responses which includes: no change, low (up to 10%) increase, medium (10-50%) increase, high (more than 50%) increase, low (up to 10%) decrease, medium (10-50%) decrease, and high (more than 50%) decrease. Similarly, the last question was asked to know about 'the average % change in number of visiting emergency room to treat migraine COVID19' which also had seven responses on either increase or decrease in the spending on treating migraine in hospital due to COVID-19. Responses except 'no option' considered as an economic impact and given score accordingly while no option scored zero. Then sum up the score for all three questions and the score two or less considered no impact otherwise there have economic impact due to COVID-19.

Data analysis

The original Excel data file was imported and analyzed using IBM SPSS version 29 (IBM corp. USA). Before final analysis, data were checked and cleaned for possible missing value and outliers using informal methods (12). Categorical data were described using their respective frequencies (N) and percentages (%). The Pearson chi-square test was applied to find out the association between COVID-19 infection with Migraine and EI. Simple and multiple logistic regression was used to build EI model with the adjustment of possible confounders. Model fitness was checked using necessary statistics of the regression model. A value $p<0.05$ was considered as a significant level.

RESULTS

A sample of 198 migraine patients was analyzed after cleaned data for extreme values. Majority of the patients were Saudi resident (95.5%), one third (31.8%) of them were from bellow 30 years age group. Around 80 percent (79.8%) of participants having college graduate, while around two thirds (63.1%) were unemployed. More than half of the patients (51.5%) monthly income was indicated below SAR-5000 (table 1). Table 2 showed that due to COVID-19, around two thirds of the respondents (67.6%) suffered from economic conditions. A 35.3% of respondents reported moderate and/or severely impacted on spending on migraine and pain killer medications whereas similar number of participants reported the average change in spending on migraine and pain killer medications increase (23.3%) and decrease (25.8%). More than half of the participants (52.5%) reported that average % change in number of visiting emergency room to treat migraine COVID19 was increased, while only 20.2% reported decreased. Table 3 shows that there was no statistically significant association observed between COVID-19 infection with migraine attack, used medication for migraine and economic impact. However, from descriptive statistics it observed that

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Table 1: Background characteristics (n=198)		
Characteristics	**Frequency (N)**	**Percent (%)**
Are you resident of Saudi Arabia		
Yes	189	95.5
No	9	4.5
Gender		
Male	64	32.3
Female	134	67.7
Age in year		
Less than 30	63	31.8
Age 30 and above	135	78.2
Employed	73	36.9
Not employed	125	63.1
Education status		
College graduates	158	79.8
Up to higher secondary level of education	40	20.2
Monthly income (SAR)		
Up to 10000	149	75.3
More than 10000	49	24.7

participants who got infection of COVID-19; faced more migraine attack (MA>1, 57.8% vs MA=1, 55.1%), received medication (Yes, 64.9% vs No, 60.0%), suffered for EB (Yes, 68.6% vs No, 61.3%) compared to those who had no COVID-19 infection. Table 4 represents the results of EB model using simple and multiple logistic regression and the model highlighted that, after adjusting other factors; patients age, education level, occupation and level of income were the significant predictors. Patients aged 30 years, and more were more likely to exhibit EB than younger (AOR: 1.82, $p<0.05$). Compared to college graduate, secondary or higher secondary level of educated patients were 3 times more likely to experienced EB (AOR: 3.17, $p<0.05$). Similarly employed participant, as well as participants with high income level were more likely to suffered for EB than employed (AOR: 1.07, $p<0.05$) and low-income participants (AOR: 2.46, $p<0.05$).

DISCUSSION

To the best of our knowledge, this is the first study that used patient perspective to examine the economic impact of COVID 19 pandemic on spending of medications which were used for treatment migraine. To estimate the possible health care–related economic burden of COVID 19 on migraineurs, we

Table 2: Economic Burden (EB) of COVID-19 on migraine patients.		
Variables	**Frequency (N)**	**Percent (%)**
Have COVID 19 impacted your spending of on migraine and pain killer medications?		
Not at all	84	42.4
Slight effect	44	22.2
Moderate effect	41	20.7
Severe effect	29	14.6
Average % change in spending of migraine and pain killer medications?		
no change	101	51
10% increase	31	15.7
20- 50% increase	11	5.6
> 50% increase	4	2
10% decrease	16	8.1
20- 50% decrease	19	9.6
> 50% decrease	16	8.1
Average % change in number of visiting emergency room to treat migraine COVID19?		
no change	54	27.3
10% increase	39	19.7
20- 50% increase	19	9.6
> 50% increase	6	3
10% decrease	15	7.6
20- 50% decrease	41	20.7
> 50% decrease	24	12.1
Economic Burden (EB)		
Yes	129	65.2
No	69	34.8

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Table 3: Association between COVID-19 infection with Migraine and EB

Characteristics	Infected by COVID-19		P-value
	No (N, %)	Yes (N, %)	
Number of migraines do you get in a week			0.452
One	40 (44.9)	49 (55.1)	
More than one	46 (42.2)	63 (57.8)	
Did you used medication for migraine			0.536
No	20 (40.0)	30 (60.0)	
Yes	52 (35.1)	96 (64.9)	
Economic Burden (EBI)			0.283
No	36 (38.7)	57 (61.3)	
Yes	33 (31.4)	72 (68.6)	

Table 4: Economic Burden (EB) model of COVID 19 on migraineurs

Predictors	OR (95% CI of OR)	AOR (95% CI of OR)
Demographics		
Age		
Age less than 30 years (R)	---	---
Age 30 years and more	3.025 (1.62, 5.65) **	1.815 (1.28, 4.13) *
Gender		
Male (R)	---	---
Female	1.448 (0.78, 2.68)	---
Education level		
College graduates (R)	---	---
Up to higher secondary level of education	3.045 (1.27, 7.31) *	3.174 (1.26, 7.99) *
Occupation		
Not employed (R)	---	---
Employed	1.379 (1.16, 2.59) **	1.072 (1.046, 2.31) *
Income (SAR)		
Less than 5,000 (R)		
5,000-10,000	2.065 (1.09, 4.38)*	1.572 (0.612, 4.039)
More than 10000	2.727 (1.25, 5.93)*	2.416 (1.87, 6.64)*
Medical conditions		
Comorbidity		
No (R)	---	---
Yes	1.844 (1.01, 3.36) *	1.132 (0.57, 2.25)

R=reference case

interviewed migraineurs with different questions about their experience during pandemic. The results of this study could help policy makers to quantify the true economic burden of COVID-19 for patients with migraine and improve the accuracy of cost-effectiveness estimates of interventions. This study showed the adverse effects of COVID 19 on the participants' incomes, level of their spending on migraine medications and number of visiting emergency room to treat migraine during COVID 19. Despite the significant benefit of the restrictions policies which were implemented to control COVID 19 pandemic among countries, it might have unanticipated negative effects on the health and economic status among people with chronic conditions[13]. Those repercussions might have happened due to different reasons including the mental pressure and stress that they felt during the pandemic. One study reported that patients described the COVID-19 disease as a very stressful period[14]. According to WHO reports people with chronic conditions including migraine are considered the most people that are most likely to have negative consequences of COVID 19[13,15]. The results of this study are consistent with other studies that reported the negative clinical and economic consequences of COVID-19 on chronic diseases (16,17). Our findings highlighted that COVID 19 pandemic has led to an increase in the number of migraine attacks. Nearly half of the participants (90 patients) indicated that the migraine attack number increased during the pandemic compared to years before. Other studies concluded that one of the clinical outcomes of COVID-19 was associated with severe headache and or worsening of migraine symptoms during both pandemic and the lockdown period[14,18]. Migraine as a chronic disease requires continuing medical visits, leading to significant health medical and nonmedical expenditure. The result of our study showed that COVID 19 pandemic had an economic impact on patients with migraine. More than a third of our participants experienced a change in their spending on migraine medications and pain killers' medications such paracetamol, ibuprofen, and diclofenac sodium. Where, 21% of them experienced an increase in their spending in those medications. This might be linked to the stress and low mood they had during the pandemic which in result deteriorate their migraines[19]. The result of our study is consistent with one study that found that the dispensing of pain killers such as paracetamol increased by 18.6% and pregabalin increased by 6.3% but other medications such as tramadol and codeine did not change[20]. Another study indicated that a 60% increase in analgesia used by patients with migraine during the pandemic[19,21]. Surprisingly, nearly 25% of the migraineurs experienced a reduction in spending on migraine and pain killers' medications while almost 51% didn't experience any change in the level of direct medical spending on migraine treatment. This might be due to the effective of the effort of the Ministry of Health, and other health sectors in Saudi Arabia to reduce the effect of COVID 19 by adapting different intervention including telemedicine and other interventions[22]. One study found that the treatment and the care of diabetic patients did not change before and during the pandemic COVID 19 in the Jazan region[22]. While direct medical costs such as spending on medications and the cost of physicians' visit are usually measured, they may only represent a part of the cost portion of the diseases like migraine which led to underestimation of the total cost. The direct non-medical cost (e.g. transportation) and lost workers productivity

are often overlooked[23]. Our study attempted to provide a picture of the direct non-medical cost that migraineurs might have (e.g. transportation) by asking them about the change in the number of their visits to the emergency room. Most of the participants experienced no change or reduction in the number of emergency room (E.R) visits while the others experienced an increase in the emergency room to treat migraine. Therefore, these results might indicate that there was reduction or no change in the direct non-medical cost for migraineurs during the COVID 19. This might indicate that migraineurs preferred to manage their migraine without going to E.R. Our results are consistent with another study that reported a low percentage of migraineurs visited the emergency department and a high number of patients with migraine did not contact their physician for consultation during the COVID 19 pandemic[24]. Our results showed that some demographic variables are associated with the economic burden of COVID 19 on migraineurs. With increasing age, the risk of economic burden increases 3 times during pandemic. The reason might be the increase of attack number that reported in older participants during COVID 19 as compared to younger participants which as result increase the economic burden on them. Furthermore, the findings showed that there was a statistical significance association between the employed participants and the risk of economic impact of migraine. This might indicate that employees had to spend more on migraine medications during the pandemic. The substantial economic impact of migraine can be seen also in the workers who absent from the work due to migraine which called absenteeism and the loss in productivity due to migraine can be significant. One study reported that two-thirds of the financial burden is linked to indirect costs of migraine. Therefore, migraineurs, companies, and third party have an economic stake in minimizing the migraine impact[25]. The study findings highlighted the association between migraineurs who were infected with COVID 19 and its economic burden on them. Although the was no statistically significant association found between COVID-19 infection and economic impact, our descriptive showed that migraineurs who infected with COVID-19 had to spend more on migraine and pain killers' medications compared to those who had no COVID-19 infection. These findings are consistent with another study that conducted among 5 countries (India, China, Hong Kong, Korea, and Vietnam) which found that people with chronic conditions had different challenges such as worsening economic status and difficulties in accessing health care or medications[17].

LIMITATIONS

This study has some limitations. First, the cross-sectional nature of this study limits the causal inferences between the COVID 19 pandemic and the economic impact on the patients with chronic migraine. Although we obtained the data directly from the patients, it cannot be considered a representative of all Saudi population in different cities. Therefore, these results cannot be generalized. Third, although we had clear picture about direct medical cost, we were not able to collect information on the indirect cost including salary and earnings and also intangible cost including suffering and fatigue that patient with migraine might have during the pandemic. Therefore, future research should include all different types of health care costs including direct, indirect, and intangible costs.

CONCLUSION

COVID 19 imposes a considerable economic burden on patients and societies. This study aimed to provide a preliminary picture about the direct economic impact of COVID 19 on spending on migraine medications and pain killers. Stress and anxiety might increase the number of migraine attacks which in result increasing the spending on medications. Most of the patients with migraines avoided going to E.R and preferred to take medications at their homes. Future research should focus on estimating the total cost of migraine during COVID 19 by including all different types of health care costs from societal perspective.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare

References

1. Alkahtani RF, Alrumaih SS, Algezlan SS, et al. The impact of migraine disease on work productivity and quality of life among the adults in Riyadh, Saudi Arabia. Cureus. 2022; 14(8). https://doi.org/10.7759%2Fcureus.27733
2. National institute of neurological disorders and disorders [Internet]. Migraine: [cited 2023 Nov]. Available from: https://www.ninds.nih.gov/healthinformation/disorders/migraine
3. Andrighetto G, Szekely A, Guido A, et al. Changes in social norms during the early stages of the COVID-19 pandemic across 43 countries. Nature communications. 2024; 16;15(1):1436. https://doi.org/10.1038/s41467-024-44999-5
4. World Bank [Internet]. World development report; 2022. Emerging risks to the recovery. Finance for an equitable recovery. [cited 2023 Dec]. Available from: https://documents.worldbank.org/pt/publication/documents-reports/documentdetail/408661644986413472/world-development-report-2022-finance-for-an-equitable-recovery
5. Rascati K. Essentials of Pharmacoeconomics. Lippincott Williams & Wilkins; 2020.
6. AJMC [Internet]. Economic Impact of Migraines. The center for biosimilars. [cited 2023 Dec]. Available from: https://www.ajmc.com/view/economic-impact-of-migraines
7. Bonafede M, Sapra S, Shah N, et al. Direct and indirect healthcare resource utilization and costs among migraine patients in the United States. Headache: The Journal of Head and Face Pain. 2018;58(5):700-14. https://doi.org/10.1111/head.13275
8. Alenzi KA, Al-Malky HS, Altebainawi AF, et al. Health economic burden of COVID-19 in Saudi Arabia. Frontiers in Public Health.

2022; 10:927494. https://doi.org/10.3389/fpubh.2022.927494
9. Cutler DM. How COVID-19 changes the economics of health care. InJAMA Health Forum 2021 (Vol. 2, No. 9, pp. e213309-e213309). American Medical Association. doi:10.1001/jamahealthforum.2021.3309
10. Albalawi MF, Alanazi WL, Albalawi HS, et al. Prevalence of migraine headache in Saudi Arabia: a systematic review and meta-analysis. Cureus. 2023;15(4). https://doi.org/10.7759%2Fcureus.37560
11. Bamalan BA, Khojah AB, Alkhateeb LM, et al. Prevalence of migraine among the general population, and its effect on the quality of life in Jeddah, Saudi Arabia. Saudi Medical Journal. 2021;42(10):1103. https://doi.org/10.15537%2Fsmj.2021.42.10.20210575
12. Islam A, Islam N, Bharati P, et al. Socio-economic and demographic factors influencing nutritional status among early childbearing young mothers in Bangladesh. BMC women's health. 2016;16: 1-9. DOI 10.1186/s12905-016-0338-y
13. Singh K, Kondal D, Mohan S, et al. Health, psychosocial, and economic impacts of the COVID-19 pandemic on people with chronic conditions in India: a mixed methods study. BMC public health. 2021; 21:1-5. doi: 10.1186/s12889-021-10708-w.
14. Houben R. Reduced frequency of migraine attacks following coronavirus disease 2019: a case report. Journal of Medical Case Reports. 2023;17(1):62. https://doi.org/10.1186/s13256-023-03795-3
15. Camacho-Rivera M, Islam JY, Vidot DC. Associations between chronic health conditions and COVID-19 preventive behaviors among a nationally representative sample of US adults: an analysis of the COVID impact survey. Health equity. 2020;4(1):336-44. https://doi.org/10.1089/heq.2020.0031.
16. World Health Organization. The impact of the COVID-19 pandemic on noncommunicable disease resources and services: results of a rapid assessment. World Health Organization. 2020. https://iris.who.int/handle/10665/334136.
17. Singh K, Xin Y, Xiao Y, et al. Impact of the COVID-19 pandemic on chronic disease care in India, China, Hong Kong, Korea, and Vietnam. Asia Pacific Journal of Public Health. 2022;34(4):392-400. https://doi.org/10.1177/10105395211073052
18. Verhagen IE, van Casteren DS, de Vries Lentsch S, et al. Effect of lockdown during COVID-19 on migraine: A longitudinal cohort study. Cephalalgia. 2021;41(7):865-70. https://doi.org/10.1177/0333102420981739
19. Angus-Leppan H, Guiloff AE, Benson K, Guiloff RJ. Navigating migraine care through the COVID-19 pandemic: an update. Journal of Neurology. 2021;268(11):4388-95. https://doi.org/10.1007%2Fs00415-021-10610-w
20. Mattsson M, Hong JA, Frazer JS, et al. Trends in medication use after the onset of the COVID-19 pandemic in the Republic of Ireland: an interrupted time series study. International Journal of Pharmacy Practice. 2024;1;32(1). https://doi.org/10.1093/ijpp/riae013.001
21. Al-Hashel JY, Ismail II. Impact of coronavirus disease 2019 (COVID-19) pandemic on patients with migraine: a web-based survey study. The journal of headache and pain. 2020; 21:1-9. https://doi.org/10.1186/s10194-020-01183-6
22. Oraibi O, Alamer A, Zogel B, et al. Impact of COVID-19 on patients with diabetes standard of care in the Jazan Region, Saudi Arabia. Materia Socio-medica. 2022;34(4):272. https://doi.org/10.5455%2Fmsm.2022.34.272-277
23. Kaylor A. Exploring the Economic Toll of Chronic, Infectious Diseases in the US. Life science intelligence. 2023. [cited 2024 Feb]. Available from: https://lifesciencesintelligence.com/features/exploring-the-economic-toll-of-chronic-infectious-diseases-in-the-us
24. Aleyeidi NA, Alqahtani RS, Alotaibi HF, et al. Exploring the impact of the COVID-19 quarantine on the severity of headache, migraine, and stress in Saudi Arabia. Journal of pain research. 2021:3827-35. https://doi.org/10.2147/JPR.S332886
25. Edmeads J, Mackell JA. The economic impact of migraine: an analysis of direct and indirect costs. Headache: The Journal of Head and Face Pain. 2002;42(6):501-9. https://doi.org/10.1046/j.1526-4610.2002.04262.x