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Impact of the COVID-19 lockdown on antibiotic sales in suburbs of Galle

KMIM Rudrigu[1], ILAN Darshana[2], M Kommalage[3]

[1]Department of Nursing, Faculty of Allied Health Sciences, University of Ruhuna, Galle, Sri Lanka.
[2]Department of Community Medicine, [3]Department of Physiology, Faculty of Medicine, University of Ruhuna, Galle, Sri Lanka.

Correspondence: Prof. Mahinda Kommalage
e-mail: *mahinda1@gmail.com*
https://orcid.org/0000-0002-2968-4341
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ABSTRACT

Introduction: Antibiotics are considered as one of the highest selling drug classes all over the world. This is more evident in low-income countries such as Sri Lanka. With the introduction of travel restrictions and hygiene measures due to the COVID-19 outbreak, one can expect a reduction in usage of non-COVID antibiotics among the general public. The aim of this study is to assess the impact of COVID-19 on the sales of common antibiotics in community pharmacies during the lockdown period in the suburbs of Galle district.

Methods: A cross-sectional study was conducted based on reported antibiotic sales in three community pharmacies in Galle suburbs, Sri Lanka. During the two lockdown periods, information on sales of four commonly used antibiotics (Co-amoxiclav, Cefuroxime, Ciprofloxacin, and Metronidazole) were obtained from three pharmacies. For comparison, sales data for two commonly used non-antibiotic drugs (Diclofenac sodium and Losartan potassium), were obtained for the same period. Sales of these drugs were compared before and during lockdown periods using non-parametric tests at 0.05 significance level.

Results: Clear reductions in sale of antibiotics and control drugs were identified during both lockdown periods. There was a significant difference between the reductions of antibiotic sale in the first and second lockdown periods (52% vs 12%, $p<0.05$). The reduction of sales between antibiotics and control drugs during two lockdown periods is statistically significant ($p<0.001$).

Conclusions: There was a reduction in both antibiotic and controlled drug sales during both lockdowns. A comparatively higher antibiotic sale was identified in the second lockdown and possibly due to the relaxation of lockdown restrictions during that time.

Keywords: *Antibiotic sales, community pharmacy, COVID-19, lockdown periods.*

Introduction

The COVID-19 outbreak, which started in Wuhan, China, is due to a respiratory infection caused by the SARS-CoV-2 virus. The World Health Organization (WHO) announced COVID-19 as a pandemic on 11th March 2020 (1). The first case of COVID-19 in Sri Lanka was reported in late January 2020. The government of Sri Lanka tried to curtail the spread of the disease by imposing various restrictions on the public restricting movement of the people, introducing the new concepts of lockdown, social distancing, working-from-home and distant learning, prohibition of social gatherings and international travel, closure of educational

institutes, imposing curfew and encouraging infection control practices like wearing facemasks and hand hygiene (2).

Sri Lanka has experienced three main waves of COVID-19. The first wave lasted from January 2020 to October 2020, the second wave lasted from October 2020 to April 2021, and the third wave began after 15th of April 2021 (3). Curfew was implemented for numerous periods to prevent the spread of the disease. In the first wave, an island-wide lockdown was implemented for one month period from March to April 2020. In the second wave, curfew was imposed primarily in the Western province for weeks in early November 2020. An island-wide lockdown was imposed for one month from May to June 2021 in the third wave.

These Lockdowns and curfew limited the movement of people within the country as well as through the airport. However, the implementation of restrictions and hygienic measures was not the same during the three waves. All the measures were very strict during the first wave, while the lockdown was limited to part of the country during the second wave and restrictions associated with the lockdown were relatively less strict during the third wave (4).

It is reasonable to assume that above measures could have possibly led to reduction of bacterial infections, especially respiratory tract infections which require antibiotics in the treatment. Several studies have already reported reduced antibiotic usage associated with COVID-19 restrictions in Sweden (17%), Netherlands (21%), United States (39%), and England (15%) (5-8).

Although several studies have been conducted in other countries, we could not find any published data from Sri Lanka to assess the impact of COVID-19-related restrictions on antibiotic sale. Therefore, this study was conducted to assess the impact of COVID-19 on the sales of four selected antibiotics in community pharmacies during the lockdown period in the suburbs of Galle district.

Methods

A cross sectional study was conducted based on reported antibiotic sales in three community pharmacies in the Galle suburbs, Sri Lanka. Co-amoxiclav, cefuroxime, ciprofloxacin and metronidazole were assessed under antibiotic sales. For each antibiotic, different tablet strengths were considered separately for data analysis. These four antibiotics were selected as they are the highest-selling antibiotics in this community (9). Amoxicillin was excluded from the study due to being out of stock during some data collection periods in some pharmacies. Sales records of diclofenac sodium and losartan potassium during the same periods were obtained from the same pharmacies for comparison with antibiotic sales during the lockdown period.

Since, the second-wave-associated lockdown had limited influence on the area where the study was conducted, the data collected during the first wave and the third wave were considered in calculation and subsequently called as first lockdown and second lockdown. First lockdown was from March 2020 to April 2020 and for the comparison, February 2020 to March 2020 period was considered as the period before the lockdown. Similarly, the second lockdown was from May 2021 to June 2021 and April 2021 to May 2021 was considered as the period before the second lockdown. Total sales of each antibiotic were counted and compared before and during each lockdown period.

Statistical Package for the Social Sciences (*SPSS)* was used for data analysis using non-parametric tests. Wilcoxon sign rank test was used to compare antibiotic sales before and during each lockdown. Mann-Whitney U test was used to compare the differences in sales between antibiotics and drugs in the control group. The level of significance was considered as 0.05.

Ethical clearance was obtained from the Ethics Review Committee of the Faculty of Allied Health Sciences, University of Ruhuna.

Results

Sales of antibiotics and drugs in the control group during two lockdown periods were assessed (Table 1) and co-amoxiclav 625 mg had the highest sales before and during each lockdown period.

During the first lockdown, the highest and the lowest reduction of sales were observed in cefuroxime 250 and co-amoxiclav 375 mg respectively. The highest sale reduction was in metronidazole 200 mg

and the lowest reduction in co-amoxiclav 375 mg during the second lockdown.

Sales of antibiotics and drugs in the control group during two lockdown periods were assessed (Table 1) and co-amoxiclav 625 mg had the highest sales before and during each lockdown period.

During the first lockdown, the highest and the lowest reduction of sales were observed in cefuroxime 250 and co-amoxiclav 375 mg respectively. The highest sale reduction was in metronidazole 200 and the lowest reduction in co-amoxiclav 375 mg during the second lockdown.

Sales reduction in antibiotics and drugs in control groups were compared for each lockdown using Wilcoxon sign-rank test (Table 2).

Significant sales reductions were observed in antibiotics and drugs in the control group. Antibiotic sale reduction is with higher significance than the drug in control group during the first lockdown while this pattern was opposite during the second lockdown.

Mann-Whitney U test was used to compare the percentage difference in sales between antibiotics and drugs in the control group for each lockdown (Table 3).

Percentage sales reduction of antibiotics and other drugs were significantly different during the first lockdown as well as the second lockdown. However, the sales reduction in antibiotics in the first lockdown is significantly higher than that of the second lockdown, (p=0.04) while the sales reduction of drugs in the control group were not different in the two lockdown periods (p=0.73).

Table 1: Sales of antibiotics (n=7) and drugs in the control group (n=3) before and during lockdown periods in selected suburbs of Galle district

	First lockdown (number of sales)			**Second lockdown (number of sales)**		
Antibiotics	Before	During	% reduction	Before	During	% reduction
Co-amoxiclav 375 mg	585	330	43.5	451	424	5.9
Co-amoxiclav 625 mg	4045	1882	53.4	3029	2818	6.9
Ciprofloxacin 250 mg	229	88	61.5	474	305	35.6
Ciprofloxacin 500 mg	1691	874	48.3	1883	1464	22.2
Metronidazole 200 mg	1607	590	63.2	2218	1047	52.7
Cefuroxime 250 mg	429	114	73.4	175	144	17.7
Cefuroxime 500 mg	1141	589	48.3	1170	1004	14.1
Total	8036	4467	55.9 (average)	9400	7206	22.1 (average)
Drugs in control group						
Losartan 25 mg	21491	14914	30.6	22946	6577	71.3
Losartan 50 mg	74901	56122	25.0	93472	18779	79.9
Diclofenac 50 mg	2497	679	72.8	3251	1818	44.0
Total	98889	71715	42.8 (average)	119669	27174	65.0 (average)

Table 2: Sales reduction in antibiotics and drugs in control groups before and during lockdown periods in selected suburbs of Galle district

	Before (Median)	During (Median)	*p* value
First lockdown			
Antibiotics	313	172	<0.001*
Drugs in control group	7531	4759	0.008*
Second lockdown			
Antibiotics	277	238	0.039*
Drugs in control group	6144	5454	0.008*

**Significance level at 0.05*

Median sales reduction of antibiotics and drugs in the control group were compered using nonparametric analysis.

Table 3: Differences in sales between antibiotics and drugs in the control group for each lockdown in selected suburbs of Galle district

	Antibiotic sale reduction (Median)	Control drug sale reduction (Median)	Significance of differences between antibiotic and control (*p* value)
First lockdown	52%	27%	0.001*
Second lockdown	12%	24%	<0.001*

**Significance level at 0.05*

Percentage sales reduction of antibiotics and drugs in the control group were compered using non-parametric analysis.

Discussion

The study found a considerable reduction in both antibiotic and other drug sales in community pharmacies during two lockdowns. One possible reason is the deprivation of health services to the general public. As a result of the lockdown, the majority of people with the requirement for medical care were unable to meet a doctor, receive institutional medical care, and access a pharmacy (10).

During the first lockdown, the mean percentage antibiotic sales reduction is 52% and that is a clear reduction of sales. However, during the second lockdown, the mean percentage of antibiotic sales reduction is only 12%. Minimum reduction of antibiotics sales during the second lockdown compared to the first lockdown while control drugs sale reduction remained the same. This may be due to the 'relaxed' COVID-19 related restrictions and preventive strategies implemented by the government during the second lockdown in 2021 (the third COVID-19 wave) compared to the first lockdown in 2020 (the first COVID-19 wave). Vehicles and the public moved freely on the roads during the lockdown period imposed during the third wave and it was reported that 88,000 vehicles came into Colombo every day during the

lockdown (4). It seems that the general public started to purchase antibiotics with the relaxation of restrictions during the second lockdown, however, such behaviour was not observed in the control drugs. If healthcare deprivation is the reason for reduced sales of drugs, both antibiotics and controlled drug sales should behave the same. But this increased antibiotic sale in the second lockdown suggests the possible other factors have contributed to the reduction of antibiotic sales during the first lockdown.

One possible contributor is the reduction of infections with tight restrictions. One can expect a reduction in infections, especially in respiratory tract infections due to the strict prevention strategies of the first phase such as the prohibition of social gatherings, encourage social distancing, the closure of educational institutes, wearing face masks, proper hand hygiene practices etc. Two antibiotics, co-amoxiclav and cefuroxime, which are commonly used for respiratory infection showed higher reduction in their sales in first lockdown compared to second lockdown period considered in the study.

Another possible contributor is a reduction in irrational antibiotic usage. Free use of antibiotics without a prescription was reported as a high occurrence in the community in which this study was conducted (11). COVID-19 preventive restrictions might have reduced those irrational practices due to restricted access to pharmacies, especially during the first lockdown in which restrictions were strict.

Our findings are in line with several international studies. In Canada, the rate of antibiotic dispensing fell by 26.5% in the first few months of the COVID-19 period compared to the pre-COVID period (12), in Sweden, overall antibiotic dispenses from pharmacies was reduced by 17% in 2020, compared to 2019 (13), in the United States, antibiotic dispensing in retail pharmacies during the COVID-19 decreased steadily from January to May 2020, with the biggest drops in April (-39%) and May (-42%) (14).

In conclusion, there was a sharp reduction in both antibiotic and control drug sales during the lockdown periods with higher antibiotic sale reduction during the first lockdown. COVID-19 restrictions associated with healthcare deprivation, reduction in infections, especially in respiratory tract infections due to associated health measures, and reduction of irrational antibiotic usage might have contributed to this.

As a limitation of the study, we have not analysed the availability of drugs in pharmacies which may have influenced the results other than the demand specially during lockdown periods. Online drug requests and postal or other drug delivery methods may alter the drugs sale during lockdown periods. But these methods might increase the sale rather than decrease

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