Original Research Article

Seasonal Variation in an Outpatient Antibiotic Prescription Rates in Alkharj

ABSTRACT

Aim: The aim of this study was to describe the seasonal variations in dispensing antibiotic prescriptions in the outpatient setting of a public hospital in Alkharj

Methodology: A retrospective cross-sectional study was conducted. The outpatient prescriptions in 2017 and 2018 were collected from medical records in a public hospital in Alkharj.

The data include the number of prescribed antibiotics in general, the number of prescribed antibiotics in different months and seasons in the outpatient setting.

Results: In the outpatient setting in 2017 and 2018, antibiotics were prescribed excessively in most of the months. About 27.84 **%** of the prescriptions in 2017 were in spring season and about 26.64 **%**of the prescriptions in 2018 were in autumn. Total number of antibiotics prescriptions in 2017 and 2018 were 5348 in spring followed by 5097 in autumn.

Conclusion: The results of the present study showed the widespread use of antibiotics by practitioners that was associated with season of prescribing. In general, there are excess use of antibiotics in all months. It is important to understand how the prescribing of antibiotic varies throughout the year to design an appropriate intervention to decrease incorrect antibiotic use.

Keywords: *Seasonal variation, Outpatient, Antibiotics, Prescribing rates.*

1. INTRODUCTION

Antibiotics are drugs that are used to treat and to prevent bacterial infections but not for other infections such as viral infections. Antibiotic resistance occurs when bacteria change in response to the usage of these medicines. Bacteria, not animals or humans, become resistant to antibiotic. These bacteria may infect not only humans but also animals, and the infections they cause are harder to treat than those caused by non-resistant bacteria. [1]

Antibiotic resistance continues to be a threat that affect the efficacy of antibiotics and pose a significant challenge for prescribers who treat patients with bacterial infections. Infections caused by resistant organisms limit the clinicians' management options because there is a lacking in the development and availability of novel antibiotics. [2, 3] There is a growing evidence from previous studies that antibiotic excessive use is a main risk factor for the development of antibiotic resistance. [4,5] Therefore, to decrease the number of infections caused by resistant bacteria, unsuitable antibiotic prescribing must be decreased. [6–11]

In the United States the majority of antibiotics are prescribed in primary care settings for the management of infections in the upper respiratory tract, for which antibiotic therapy is occasionally needed. [12–17] Additionally, most of the antibiotics are prescribed in the first and fourth quarters of the calendar year particularly in winter, because in winter the bacterial and viral illnesses such as influenza and rhino sinusitis are common. [18–20]

It is important to identify when and where to use appropriate interventions to decrease antibiotics use in ambulatory care. The aim of this study was to describe the seasonal variations in dispensing antibiotic prescriptions in the outpatient setting of a public hospital in Alkharj in order to identify the opportunity for clinical interventions where seasonal peaks may show increases in unsuitable antibiotic use.

2. METHODOLOGY

A retrospective cross-sectional study was conducted. The outpatient prescriptions in 2017 and 2018 were collected from medical records in a public hospital in Alkharj.

The data include the number of prescribed antibiotics in general, the number of prescribed antibiotics in different months and seasons in the outpatient setting. We included only the most commonly used antibiotics which are amoxicillin / clavulanic acid, amoxicillin, metronidazole, ciprofloxacin, cefuroxime and azithromycin.

The exclusion criteria include the inpatient prescriptions and the outpatient prescription before 2017 or after 2018, and other antibiotics that were not prescribed commonly.

The data were collected and analyzed using excel software. The data represented by frequencies and percentages. This study is approved by Institutional Review Board Log No. 18-474E

3. RESULTS

In the outpatient setting in 2017 and 2018, antibiotics were prescribed excessively in most of the months. Table 1 shows the outpatient prescribing of the most common antibiotics in different months in 2017 and table 2 shows the outpatient prescribing of the most common antibiotics in different months in 2018.

Table 1. The outpatient prescribing of the most common antibiotics in different months in 2017

Antibiotic	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Metronidazole	77	76	70	82	105	81	57	75	62	57	79	75
Ciprofloxacin	68	78	66	41	56	46	63	80	51	51	53	40
Cefuroxime	74	87	57	38	101	58	70	54	40	38	21	49
Amoxicillin	367	304	282	208	334	325	328	389	272	301	364	281
Amoxicillin / Clavulanic acid	211	318	269	225	227	189	154	242	218	227	246	150
Azithromycin	91	85	138	105	76	31	106	86	124	132	81	54
Total	888	948	882	699	899	730	778	926	767	806	844	649

Table 2. The outpatient prescribing of the most common antibiotics in different months in 2018

Antibiotic	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Metronidazole	133	139	97	81	88	103	96	81	86	86	76	96
Ciprofloxacin	59	60	55	62	66	62	62	78	67	69	60	73
Cefuroxime	53	56	38	35	43	27	25	43	42	76	31	24
Amoxicillin	306	265	202	270	231	225	321	279	299	395	312	290
Amoxicillin / Clavulanic acid	315	306	273	169	156	208	233	262	336	223	350	257
Azithromycin	82	116	75	86	78	91	118	116	136	67	79	103
Total	948	942	740	703	662	716	855	859	966	916	908	843

About 27.84 **%** of the prescriptions in 2017 were in spring season and about 26.64 **%**of the prescriptions in 2018 were in autumn. Table 3 shows the outpatient prescribing of the most common antibiotics in different seasons in 2017 and table 4 shows the outpatient prescribing of the most common antibiotics in different seasons in 2018

Table 3. The outpatient prescribing of the most common antibiotics in different seasons in 2017

Season	Number of antibiotic prescribed	Percentage of antibiotic prescribed
Spring	2718	27.84
Summer	2328	23.84
Autumn	2417	24.75
Winter	2299	23.55

Table 4. The outpatient prescribing of the most common antibiotics in different seasons in 2018

Season	Number of antibiotic prescribed	Percentage of antibiotic prescribed
Spring	2630	26.14
Summer	2081	20.68
Autumn	2680	26.64
Winter	2667	26.51

Total number of antibiotics prescriptions in 2017 and 2018 were 5348 in spring followed by 5097 in autumn, 4966 in winter and 4409 in summer. The outpatient prescribing of the most common antibiotics in different seasons in 2017 and 2018 is shown in table 5 and the total prescriptions in different months are shown in table 6.

Table 5. The outpatient prescribing of the most common antibiotics in different seasons in 2017 and 2018

Variable	Spring	Summer	Autumn	Winter
Number of antibiotics prescribed in 2017 and 2018 (Total)	5348	4409	5097	4966
Percentage of total antibiotics prescribed	26.98	22.24	25.71	25.05

Table 6. The total outpatient prescribing of the most common antibiotics in different months

Antibiotic	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Prescriptions in 2017	888	948	882	699	899	730	778	926	767	806	844	649
Prescriptions in 2018	948	942	740	703	662	716	855	859	966	916	908	843
Total Prescriptions	1836	1890	1622	1402	1561	1446	1633	1785	1733	1722	1752	1492

4. DISCUSSION

A high percentage of the prescriptions in 2017 were in spring season (27.84 %) and in 2018 a high percentage of the prescriptions in 2018 were in autumn (about 26.64%). For the total antibiotics use for 2 years in the present study, spring followed by autumn were the seasons of the highest prescriptions more than winter and summer.

Katie J. Suda et al reported that the antibiotic prescribing is higher in winter than in summer but in their study they compare between the prescriptions in 2 seasons only summer and winter. [21] Similar to this result in our study the prescriptions in winter were higher than in summer but less than autumn and spring.

In contrast to our study, the antibiotic prescriptions in winter are more than other seasons as reported by several European and Canadian studies, they stated that the increase in antibiotics use in the winter months ranged from 21% to 42%. [19, 22-24] Moreover, Bauchner H et al reported that antibiotics are prescribed in winter more than other seasons and that a high percentage of antibiotic prescriptions in the winter are estimated to be unsuitable. [25]

Additionally, previous study stated that the use of antibiotic is more in winter and that the excess use of antibiotics in the winter could have a significant effect on resistance. [18]

Many physicians prescribe antibiotics to treat viral infections. Seasonal peaks in antibiotics generally used to treat viral upper respiratory tract infections remained unchanged during cold and influenza season. [26]

Seasonal influenza viruses are detected year-round but viruses are most common during the fall and winter. The timing and duration of flu seasons can vary, but generally influenza activity begins to increase in October. Most of the time flu activity peaks between December and February, although activity can last as late as May. [27] In the present study, the highest prescribing was in April followed by March.

Pathak A et al reported that in the peak-prescribing rate of antibiotics was during the summer (75%), while the teaching hospital had a peak prescribing rate during the rainy season (70%) and this study also in contrast to our study. [28]

It is noticed that the seasonal variations in prescribing antibiotics are different for the various antibiotics. Highest prescribing rate of metronidazole was in April followed by march, highest prescribing rate of ciprofloxacin was in October followed by April, highest prescribing rate of cefuroxime was in July followed by April, highest prescribing rate of amoxicillin was mainly in December followed by March, highest prescribing rate of amoxicillin / clavulanic

acid was mainly in April followed by January and highest prescribing rate of azithromycin was in November followed by September.

Amoxicillin / clavulanic acid, metronidazole and cefuroxime were prescribed mostly in spring, ciprofloxacin and azithromycin were prescribed mainly in autumn, amoxicillin was prescribed mainly in winter.

In contrast to our study, Safaeian L et al stated that that seasonal peak was observed for penicillins and cephalosporins prescriptions in autumn. But regarding macrolides, similarly he reported that they were significantly more prescribed during autumn. [29] Furthermore, Suda KJ et al reported that more antibiotic prescribing, predominately driven by the macrolide and penicillin classes, in the outpatient setting was observed in the winter months. [21]

5. CONCLUSION

The results of the present study showed the widespread use of antibiotics by practitioners that was associated with season of prescribing. Amoxicillin and amoxicillin / clavulanic acid were the most prescribed antibiotics. In general, there were excess use of antibiotics in all months but each antibiotic was prescribed more in specific months. It is important to understand how the prescribing of antibiotic varies throughout the year, this will be useful for designing an appropriate intervention strategy to decrease incorrect antibiotic use.

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