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ORIGINAL ARTICLE **OPEN ACCESS**

The Impact of An Educational Intervention in A Community Pharmacy on Patient Antibiotic Adherence During Dispensing

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ABSTRACT
Inappropriate use of antibiotics plays an important role in the spread and increase of bacterial resistance, which is a major health care issue. Non-adherence to antibiotic therapy is a major determinant of treatment effectiveness. In regard to short term antibiotic adherence treatment, non-adherence may increase the risk of therapeutic failure, re-infection and bacterial resistance which may create a subsequent need for more aggressive treatments and may lead to increased hospital admissions. This study aimed to assess the effectiveness of an educational intervention on antibiotic adherence and also focused on identifying barriers of nonadherence towards medication among the study population. A community pharmacy-based open label control-experimental study design was carried out for three months from 10 august 2022 to 10 January 2023 to enhance antibiotic adherence in patients and also find out the factors associated with non-adherence. The subjects were categorised into two groups control and interventional. Total 237 subjects are enrolled were 45 were missed for follow-up because they could not be reached by phone so they were eliminated from the study. Finally, 192 valid cases were analysed in the study. The sociodemographic and clinical variables were compared with in control and interventional groups. The mean age of control group was 48.4 (SD,18.7) and in the interventional group it was 48.25 (SD,17.8) years. Both groups were dominated by men (i.e., 62% and 57% in the control and interventional groups, individually). There were no significant differences in degree of knowledge between the groups. The majority of the patients were found in age group between 51-60 (33%in control group) and 41-50 (31% in intervention group). Adherence to antibiotic treatment was recorded after completion of duration of antibiotic therapy through telecall as it was observed 64.58% in control group and 81.25 in intervention group. The level of non-adherence was recorded mild in 12.25% & moderate 27.08% among control subjects were 16.6% and 6.25% are recorded in interventional group. Non-adherence to the antibiotics is common among patients using community pharmacies. The pharmacist involvement in educating patients regarding importance of following antibiotic duration adherence IS very much needed to improve adherence in community pharmacy patients. If the patient counselling is introduced in community pharmacies, it may help patients to avoid forgetting or delaying doses by emphasizing the benefits of antibiotics outweigh the risks associated with their use, and by providing patients with remainder strategies
Key words: *Adherence, Socioeconomic Areas, Control Group, Interventional Group, Side Effect, Antibiotic Resistance*

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INTRODUCTION

Antibiotics are one of the most commonly prescribed antimicrobial medications for the prevention and treatment of microbial infections. Antibiotic non-adherence refers to instances where patients do not take the antibiotics as prescribed [1]. The emergence and escalation of bacterial resistance is significantly influenced by the irrational use of antibiotics. Noncompliance with antibiotic medication is a significant factor affecting treatment effectiveness. Regarding the use of short-term antibiotics, non-adherence may raise the risk of therapeutic failure, re-infection, and bacterial resistance, which may necessitate the use of more vigorous treatments and may increase hospitalisation rates. Antibiotic non-adherence is influenced by an array of factors, including those linked to the prescription (such as the dosing schedule), the patient (knowledge and perceptions about antibiotics), and the physician-patient interaction [4]. The most prominent causes of non-adherence to antibiotics are forgetting to take the prescribed dose, discomfort (a side effect of the medication), polypharmacy, the cost of the drug, a lack of awareness, limited data about antibiotics, and symptom remission [2]. Both upper and lower socioeconomic groups reported significant concerns about the availability of antibiotics, which may be related to factors such as inappropriate use, the high cost of the newest and most effective antibiotics, substantial "over the counter" usage, and a rise in the production of counterfeit medications. According to a comparison study, 32% of antibiotics were

dispensed without a valid prescription, with the frequency being greater in low socioeconomic areas. A systematic review and meta-analysis study also reported that non-prescription antibiotic accessibility constituted 62% of all antibiotic access worldwide [2-6]. The outcomes of interventional research in community pharmacies aimed at promoting treatment adherence are mixed. According to studies, it is impossible to pinpoint a single, effective tactic employed by pharmacists to increase adherence, and more carefully planned and executed trials are required [7]. This study focuses on identifying barriers to nonadherence to medications within the study population as well as evaluating the effectiveness of an educational intervention on antibiotic adherence [6, 8].

MATERIAL AND METHODS

A community pharmacy-based open label control-experimental study design was carried out for three months from 10 august 2022 to 10 January 2023 to enhance antibiotic adherence in patients and also find out the factors associated with non-adherence. The information gathering was done in community pharmacy located in Tiruchanoor, Sri Balaji district, Andhra Pradesh state, India. The work was done for six months. The study population was categorised into two groups. The experimental design with a control group (CG), which followed routine dispensing practice and an interventional group (IG) was followed an antibiotic dispensing procedure. The patients aged above 20 years who visited pharmacy to collect oral antibiotics for self or caregivers during study period were included in the study. The patients those who came with antibiotic prescription and who are willing to participated in the study were selected randomly until the required sample size was attained. The patients who agreed with informed consent sign were only enrolled in the study. The assignment to groups was carried out systematically. The patients who were willing to spend at least 10 mins time with the pharmacist were enrolled in intervention group. The patients in interventional group were followed an antibiotic dispensing protocol as per ICMR guidelines. As per the ICMR guidelines antibiotics has to prescribe as five days duration for skin, soft tissue infections, UTI, RTI, community acquired pneumonia and eight days duration for hospital acquired pneumonia. The individual verbal information was given to the interventional group patient or care giver about therapy characteristics, dosage regimen, duration of treatment and how to use the antibiotic. The patients were also counselled about demerits of antibiotic resistance. the written information and leaflets were not provided. A special area was set in one corner of pharmacy and the talk was lasted about 10-15 mins. The patient's demographic details were recorded for both control and interventional groups. The information regarding education level, profession, site of infection, type of antibiotic, match duration, known the name of drug, number of medications prescribed, worried about health problem, knowledge level of antibiotic treatment, adherence to the treatment, non-adherence level, patient -perception of health[1,17]. The patient's degree of knowledge of antibiotic was evaluated before the intervention study by means of validated questioner by Garcia et al. The subject was also screened for any contraindications and drug interactions for antibiotics if it is first time of antibiotic taking. In control group normal dispensing procedure was followed and general questions asked by the user or care giver were answered. To evaluate the effectiveness of the intervention, the telephone numbers were taken from all the subjects and the telephone interview was conducted after 7 days of dispensing. In long therapy treatments the telephone interview was conducted after completion of duration of antibiotic treatment. To document accurate results the phone interviewer was blinded with group allocation details. The below flow chart explains the detailed construction of study. The antibiotic adherence treatment was measured by both moriskey-green test and also self-reported pill count method. Patient was categorised as adherent if they were qualified in both tests and categorised as non-complaint if they were found to be non-adherent in either of tests. the patients who missed single dose were categorised as mild adherent and who missed more than one dose was categorised as moderate. The health outcome in subjects was evaluated with the question like how did the treatment work on you? The answers were documented as cured, improved, the same or worse. The statistical analysis was done using stat 13.0 software. The complete data bases were included in the study. The continuous variables were tested for normality of distribution before analysis. The data was presented as frequency (%) and mean ± standard deviation. The qualitative variables were expressed as percentages and quantitative variables are measured as mean and standard deviation.

ETHICAL APPROVAL

The study was carried out after the approval of institution ethical committee, Sri padmavathi school of pharmacy, Tiruchanoor. All the participants were informed about the objectives of the study and get signed in informed consent form.

RESULTS

Initially, total of 237 patients including interventional group and control group were enrolled in the study. Among 237 subjects 45 were missed for follow-up because they could not be reached by phone so they were eliminated from the study. Finally, 192 valid cases were analysed in the study. The sociodemographic and clinical variables were compared with in control and interventional groups. The mean age of control group was 48.4 (SD,18.7) and in the interventional group it was 48.25 (SD,17.8) years. Both groups were dominated by men (i.e., 62% and 57% in the control and interventional groups, individually). There were no significant differences in degree of knowledge between the groups. The majority of the patients were found in age group between 51-60 (33%in control group) and 41-50 (31% in intervention group).

Table 1

Variables	Control group (CG) (n=96)	Mean (SD)	Intervention group (IG) (n=96)	Mean (SD)	P-Value
Mean age (SD)	48.4 (18.7)		48.25 (17.8)		0.047*
Age range n%		19.2 (11.52)		19.2 (8.10)	0.010*
21-30	5 (5.2%)		9 (9.37%)		
31-40	10 (10.4)		16 (16.67%)		
41-50	22 (22.9)		31 (32.29%)		
51-60	33 (34.3)		22 (22.9%)		
>60	26 (27.08)		18 (18.75)		
Gender n%		48(19.79)		48(12.72)	1.0000**
Male	62(64.58%)		57 (59.3%)		
Female	34 (35.4)		39 (40.62%)		
User n%		48(25.45)		48(28.28)	0.09**
Own use	66 (68.75%)		68 (70.83%)		
Care giver	30 (31.25)		28 (29.17%)		
Educational level n%		24(11.40)		24(17)	0.033*
University	27 (28.12%)		35 (36.45%)		
Secondary school	38(39.58%)		42 (43.75%)		
Primary school	20 (20.83%)		9 (9.37%)		
No schooling	11 (11.45%		10 (10.41%)		
Profession n%		16(8.71)		16(9.40)	0.005*
Student	9 (9.37%)		8 (8.33%)		
Business	29 (30.20%)		32 (33.3)		
Government job	20 (20.83%)		19 (19.8%)		
Sales	17 (17.7%)		18 (18.75%)		
Daily wager	4(4.16%)		6 (6.25%)		
Unemployed	17 (17.7%)		13 (13.54%)		
Site of infection n%		19.2(4.38)		19.2(6.97)	0.001*
RTI	26 (27.08%)		29 (30.20%)		
UTI	20 (20.83%)		22 (22.96%)		
Sinusitis	18 (18.75%)		18 18.75%)		
Dental	18 (18.75%)		17 (17.70%)		
Wounds	14 (14.58%)		10 (10.41%)		
Type of antibiotics n%		19.4(13.86)		19.2(10.79)	0.19**
Beta lactams	31 (32.29%)		32 (33.33%		
Macrolides	25 (26.04%)		23 (23.95)		
Flouro-quinolones	32 (33.33%)		28 (29.16%)		
Tetracyclines	5 (5.20%)		8 (8.33%)		
Others	4 (4.16%)		5 (5.20%)		
Name of antibiotics n%		12.125(7.93)		12(6.63)	0.105**
Amoxiclav	27 (28.12%)		26 (27.08%)		
ofloxacin	17 (17.70%)		15 (15.62%)		
norfloxin	15 (15.62%)		13 (13.54%)		

azithromycin erythromycin doxycycline cefpodoxime+ clavulanic acid ofloxacin + ornidazole	14 (14.58%) 11 (11.45%) 5 (5.40%) 4 (4.16%) 4 (4.16%)		11 (11.45%) 12 (12.5%) 8 (8.33%) 6 (6.25%) 5 (5.20%)		
No of medications n% Mono therapy Double therapy Poly medicated therapy	 9 (9.37%) 42 (43.75%) 45 (46.87%)	32(19.97)	 8 (8.33%) 41 (42.70%) 47 (48.95%)	32(21)	0.001*
Knows the name of medication n% Yes No	 49 (51.04%) 47 (48.95%)	48(1.41)	 51 (53.12%) 45 (46.87%)	48(4.24)	0.038*
Concerned about health n% Quite concerned Normal level Fairly unconcerned	 40 (41.66%) 34 (35.41%) 22 (22.91%)	32(9.16)	 49 (51.04%) 27 (28.12%) 20 (20.83%)	32(15.13)	0.47**
Level of knowledge n% No knowledge Insufficient Sufficient Optimum	 27 (28.12%) 18 (18.75%) 26 (27.08%) 25 (26.04%)	24(4.08)	 29 (30.20%) 13 (13.54%) 28 (29.16%) 26 (27.08%)	24(7.43)	0.016*
Treatment adherence n% Yes N0	 62 (64.58%) 38 (39.58%)	50(16.97)	 78 (81.25%) 22 (22.91%)	50(39.59)	0.056**
Level of non-adherence n% Mild Moderate	 13 (13.54%) 26 (27.08%	19.5(9.19)	 19 (19.79% 8 (8.33%)	13.5(7.77)	0.001*
Patient perception of health n% Worse Same Improved Cured	 9 (9.37%) 20 (20.83%) 41 (42.70%) 26 (27.08%)	24(13.34)	 9 (9.37%) 11 (11.15%) 32 (33.33%) 42 (43.75%)	23.5(16.13)	0.081**

P<0.05* = significant, P>0.05 = not significant**

Most of the people in study population were taken the medication from pharmacy for self-purpose (68.75% in CG, 70.83% in IG groups). The secondary education level was notified in maximum no of patients among both groups followed by university level education. The results of site of infection were revealed that the antibiotics are commonly prescribing for the patients with respiratory tract infections (27.08%) (cold, cough. Asthma, bronchiolitis, COPD), urinary tract infections (20.83%) and sinusitis (18.75%). The common type of antibiotics prescribed was B Lactam antibiotics (32.29%) followed by fluoroquinolones (333%). Among B Lactam antibiotics, drug amoxiclav (28.12%) is prescribed commonly in subjects. Adherence to antibiotic treatment was recorded after completion of duration of antibiotic therapy through telecall as it was observed 64.58% in control group and 81.25 in intervention group. The level of non-adherence was recorded mild in 12.25% & moderate 27.08% among control subjects were 16.6% and 6.25% are recorded in interventional group. Majority of the patients were prescribed with two (43.75% in control group, 48.95% in intervention group, monotherapy) or more than two (46.87% in control group

and 42.70 % in interventional group, polytherapy) and most of the patients are very much concerned about their health. The patient perception of health was also calculated after completing the duration of antibiotic course were interventional group reveals better results than control group. Majority of the patients reported as cured in intervention group, (41%) and 26% cured in control group. Level of non-adherence vs patient perception of health was founded statistically significant as p=0.037.

DISCUSSION

The study's findings show that adopting an educational intervention when patients visit to a pharmacy to pick up antibiotics prescribed to them boosts adherence to the medication. However, this does not imply that the patient would feel cured at the end of the treatment cycle; rather, the educational intervention in this study was effective, with an 18.8% difference between the control and interventional groups. The study conducted by Munoz EB et al [1] found as interventions carried out by health care professionals (doctors, pharmacists, nurses) are very effective in improving patient medication adherence. It is also challenging to define an overall successful medication adherence strategy led by pharmacists. The findings of our study provide important information about the effectiveness of oral interventions on compliance with therapy in community pharmacies that are very near and accessible to patients, and should be used to actively collaborate with other health professionals in determining the correct use of antibiotics. The 14 % of increase in the antibiotic adherence was recorded in the study conducted by Machaca et al [8] despite the fact that the differences were not statistically significant. The medication adherence among intervention group was founded higher than the control group in our study which is statistically significant. These findings were similar to Munoz EB et al [1] and Andres JC [5] et al studies. Among the patients the significant differences were found in between both groups were intervention group found higher than control group. Even though the infection process is self-limiting process in most cases the adherence to the antibiotic therapy as per the prescription is very important for positive outcome and also to reduce antibiotic resistance. In general, many patients don't take antibiotics as per prescription in terms of doses and duration of therapy. Different studies like Moriskey et al [9] & Fernandes M [2] reveals that there is a strong relation between adherence and health as perceived by patients. Patients commonly states that they quit antibiotic medication when they felt better or when adverse outcomes occurred. Self-medication, availability of antibiotics without prescription and not following prescribed duration of therapy are the main reasons of increasing antibiotic resistance among the population. The patient's level of knowledge is evaluated with a validated questioner, where it is main advantage for our study, as this questioner is having strong validity and reliability to assess baseline knowledge of medication in patients [10, 12, 13]. The study has certain drawbacks due to the use of multiple indirect assessments, which tend to overstate adherence, albeit employing two separate approaches can lessen the bias. Because both groups received antibiotics from the same place, a contamination effect might have occurred, and the intervention effect could have been amplified. Because the study was done in a small town, the findings cannot be generalised to larger populations. The patient allocation was not randomised, which may constitute a design flaw. In order to avoid this potential bias, future investigations should employ a randomised clinical trial design.

CONCLUSION

Non-adherence to the antibiotics is common among patients using community pharmacies. The pharmacist involment in educating patients regarding importance of following antibiotic duration adherence IS very much needed to improve adherence in community pharmacy patients. If the patient counselling is introduced in community pharmacies, it may help patients to avoid forgetting or delaying doses by emphasizing the benefits of antibiotics outweigh the risks associated with their use, and by providing patients with remainder strategies.

REFERENCES

1. Munoz EB, Dorado MF, Guerrero JE, Martínez FM. (2014). The effect of an educational intervention to improve patient antibiotic adherence during dispensing in a community pharmacy. Atencion primaria.46(7):367-75.
2. Fernandes M, Leite A, Basto M, Nobre MA, Vieira N, Fernandes R, Nogueira P, Jorge P. (2014). Non-adherence to antibiotic therapy in patients visiting community pharmacies. Intern Jourl of Clin Phar. 36:86-91.
3. Rao I, Shaham A, Yavneh A, Kahana D, Ashlagi I, Brandeau ML, Yamin D. (2020). Predicting and improving patient-level antibiotic adherence. *Health Care Manag Sci* . ;23:507-19.
4. Haag M, Hersberger KE, Arnet I. (2021). Assessing Medication Adherence Barriers to Short-Term Oral Antibiotic Treatment in Primary Care—Development and Validation of a Self-Report Questionnaire (BIOTICA). Int. J. Environ. Res. Public Health. 22;18(15):7768.
5. Andrés JC, Andrés NF, Fornos JA. (2004). Assessing pharmacist intervention on antibiotic therapy adherence. ;2(2):97-102.

6. Sanz-Corbalán I, Tardáguila-García A, García-Álvarez Y, López-Moral M, Álvaro-Afonso FJ, Lázaro-Martínez JL. (2021). Evaluation of adherence to the oral antibiotic treatment in patients with diabetic foot infection. Int J Low Extrem Wounds. 15:15347346211057342.
7. Van Wijk BL, Klungel OH, Heerdink ER, de Boer A. (2005). Effectiveness of interventions by community pharmacists to improve patient adherence to chronic medication: a systematic review. Annals of Pharmacotherapy. 39(2):319-28.
8. Machuca M, Espejo J, Gutiérrez L, Machuca MP, Herrera J. (2003). The effect of written information provided by pharmacists on compliance with antibiotic therapy. Arspharmaceutica. 44:141-57.
9. Morisky DE, Green LW, Levine DM. (1986). Concurrent and predictive validity of a self-reported measure of medication adherence. Medical care. 1:67-74.
10. Hohmann C, Eickhoff C, Radziwill R, Schulz M. (2012). Adherence to guidelines for antibiotic prophylaxis in surgery patients in German hospitals: a multicentre evaluation involving pharmacy interns. Infection. ;40:131-7.
11. Roth HP, Caron HS, Hsi BP. (1970). Measuring intake of a prescribed medication. A bottle count and a tracer technique compared. Clin Pharmacol Ther. ;11(2):228-37.
12. Garralda G, MI BP. (2009). Validation of a questionnaire to assess patients' knowledge of their medicines. Aten Primaria. 41(12):661-8.
13. Walsh KE, Cutrona SL, Kavanagh PL, Crosby LE, Malone C, Lobner K, Bundy DG. (2014). Medication adherence among pediatric patients with sickle cell disease: a systematic review. Pediatrics. ;134(6):1175-83.
14. Sanz-Corbalán I, Tardáguila-García A, García-Álvarez Y, López-Moral M, Álvaro-Afonso FJ, Lázaro-Martínez JL. (2021). Evaluation of adherence to the oral antibiotic treatment in patients with diabetic foot infection. Int J Low Extrem Wounds. 15:15347346211057342.
15. Musmar SM, Baba H, Owais A. (2014). Adherence to guidelines of antibiotic prophylactic use in surgery: a prospective cohort study in North West Bank, Palestine. BMC surgery. 14:1-7.
16. Phillips LA, Leventhal EA, Leventhal H. (2011). Factors associated with the accuracy of physicians' predictions of patient adherence. Patient Edu & Counsel. 1;85(3):461-7.
17. Lee SY, Shanshan Y, Lwin MO. (2023). Are threat perceptions associated with patient adherence to antibiotics? Insights from a survey regarding antibiotics and antimicrobial resistance among the Singapore public. BMC Public Health. 23(1):1-8.
18. Walczak S, Davila M, Velanovich V. (2019). Prophylactic antibiotic bundle compliance and surgical site infections: an artificial neural network analysis. *Patient Saf Surg*. 13:1-9.
19. DiMatteo MR, Haskard-Zolnierek KB, Martin LR. (2012). Improving patient adherence: a three-factor model to guide practice. Health Psychology Review. 1;6(1):74-91.
20. Kardas P, Lewek P, Matyjaszczyk M. (2013). Determinants of patient adherence: a review of systematic reviews. Frontiers in pharmacology. 25;4:91.
21. DiMatteo MR, Sherbourne CD, Hays RD, Ordway L, Kravitz RL, McGlynn EA, Kaplan S, Rogers WH. (1993). Physicians' characteristics influence patients' adherence to medical treatment: results from the Medical Outcomes Study. Health psychology. 12(2):93.
22. DiMatteo MR, Giordani PJ, Lepper HS, Croghan TW. (2002). Patient adherence and medical treatment outcomes a meta-analysis. Medical care. 1:794-811.
23. Myers L. (2020). Adherence to Treatment in Medical Conditions. CRC Press; 24.
24. Bodi M, Rodriguez A, Solé-Violán J, Gilavert MC, Garnacho J, Blanquer J, Jimenez J, De La Torre MV, Sirvent JM, Almirall J, Doblas A. (2005). Antibiotic prescription for community-acquired pneumonia in the intensive care unit: impact of adherence to Infectious Diseases Society of America guidelines on survival. Clin Inf Dise. 15;41(12):1709-16.

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