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ASSESSMENT OF MEDICATION DISPENSING ERRORS AND THEIR CONTRIBUTING FACTORS IN COMMUNITY PHARMACY PRACTICE SETTINGS ACROSS CUDDALORE, TAMIL NADU

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ABSTRACT

Background: Medication dispensing errors are a significant patient safety concern in community pharmacy practice. **Aim:** To assess medication dispensing errors and their contributing factors among community pharmacists in Cuddalore, Tamil Nadu. **Methods:** A prospective cross-sectional study was conducted among 108 registered community pharmacists using a validated structured questionnaire distributed through direct survey and Google Forms. Data were analyzed using descriptive and inferential statistics, including chi-square test and one-sample t-test in MS Excel, with $p < 0.05$ considered statistically significant. **Results:** Among the participants, 59.43% were aware of medication dispensing errors, while 53.77% identified look-alike/sound-alike drugs as high-risk medications. Most pharmacists agreed that preventive measures and error reporting improve pharmacy practice. Major contributing factors included lack of double-checking systems, similar drug names, and frequent interruptions during dispensing. **Conclusion:** Community pharmacists demonstrated moderate to good knowledge and positive attitudes toward medication dispensing errors. Strengthening double-checking systems, medication safety training and workflow management may help reduce dispensing errors and improve patient safety.

KEYWORDS: Medication dispensing error, Community pharmacy, Pharmacist practice, Medication safety.

1. INTRODUCTION

Medication dispensing errors are recognized globally as one of the most significant threats to patient safety in healthcare systems. Medication errors can occur during prescribing, transcribing, dispensing, administration, and monitoring processes.[1] Among these, dispensing errors are particularly important because pharmacists serve as the final checkpoint before medications reach patients. Any error during dispensing may lead to adverse drug reactions, therapeutic failure, increased healthcare costs, prolonged hospitalization, and reduced patient trust in healthcare services.[2][3]

Medication dispensing errors refer to deviations occurring during the interpretation, preparation, packaging, labeling, and supply of prescribed medicines to patients.[4] These errors include wrong drug dispensing, incorrect dosage strength, and wrong dosage form, wrong quantity, labeling mistakes, omission errors, and dispensing medicines to the wrong patient.[5] Dispensing errors may arise due to human factors, system-related failures, communication gaps, high workload, poor prescription clarity, and interruptions during dispensing.[6]

Community pharmacies are among the most accessible healthcare settings and serve as an essential source of healthcare services, especially in developing countries.[7] Community pharmacists are increasingly involved in patient counseling, medication review, chronic disease management, and medication safety practices. However inadequate staffing, look-alike/sound-alike medications,

and lack of structured reporting systems can increase the risk of medication dispensing errors.[8]

Worldwide studies have shown wide variations in the prevalence of dispensing errors. Research from different countries has identified high workload, poor communication, illegible prescriptions, lack of double-checking systems, and environmental distractions as common contributors to medication dispensing errors. Despite growing awareness regarding medication safety, underreporting of dispensing errors remains a major challenge in pharmacy practice.[9]

In India, particularly in regional community pharmacy settings, limited studies are available regarding pharmacists' knowledge, attitudes, practices, and factors associated with medication dispensing errors Understanding pharmacists' perceptions and practices is important for identifying gaps and implementing preventive interventions.[10]

2. MATERIALS AND METHODS

Study Design and Setting

A cross-sectional study was conducted over a period of 3 months among registered community pharmacists practicing in selected community pharmacies across Cuddalore District, Tamil Nadu. The study population consisted of registered pharmacists working in community pharmacy settings.

Sample Size

The sample size was calculated using the Raosoft sample size calculator with a 95% confidence level and a 5% margin of error. The final sample size was determined to be 108 participants.

Ethical Considerations

Informed consent was obtained from all participants prior to data collection, and participant confidentiality was maintained throughout the study.

Study instrument

The study instrument consisted of a structured and physician-validated questionnaire developed in accordance with the objectives of the study. The questionnaire contained 26 questions divided into five sections, covering demographic characteristics, knowledge, attitude, practice, and factors associated with medication dispensing errors among community pharmacists. The questionnaire was designed to assess pharmacists' knowledge, attitude, practice, and factors related to medication dispensing errors.

Inclusion Criteria

- Registered community pharmacists.
- Pharmacists willing to participate in the study.

Exclusion Criteria

- Hospital pharmacists.
- Pharmacies managed by non-professionals.
- Participants unwilling to participate.

Data Collection Procedure

The structured questionnaire was distributed directly to community pharmacists and through Google Forms. Participants were informed about the objectives of the study, and informed consent was obtained before data collection.

Statistical Analysis

The collected data were entered and analyzed using Microsoft Excel. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize the data. Inferential statistical tests, including the chi-square test and one-sample t-test, were performed to determine statistical significance. A p-value of less than 0.05 was considered statistically significant.

3. RESULTS AND DISCUSSION

DEMOGRAPHIC DETAILS OF CONSENT

The entire question from the questionnaire provided the information need to frame the results.

Table No. 1: Consent.

CONSENT	PERCENTAGE
Agree	91.66%
Disagree	8.33%

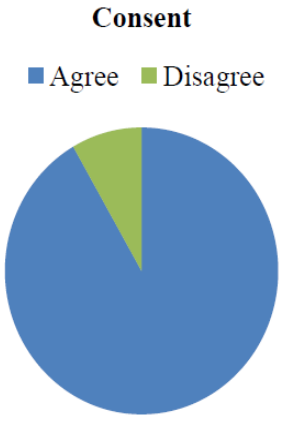

Fig. 1: Responders of Consent.

Table 1 shows a total of 108 community pharmacists participated in the study. Among them, 99 responded to the questionnaire, yielding a response rate of 91.66%.

DEMOGRAPHIC DETAILS OF GENDER

Table No. 2: Gender.

GENDER	PERCENTAGE
Male	61.32%
Female	22.64%
Prefer not to say	10.00%

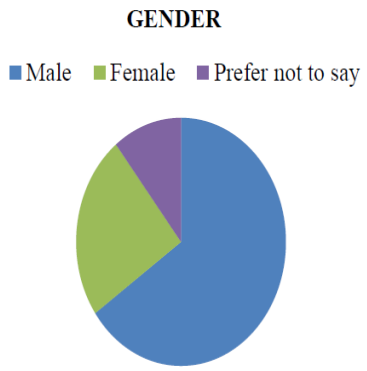

Fig. 2: Gender.

Table 2 presents the gender distribution of the respondents based on self-reported data obtained from the questionnaire. Among the respondents, 65 (61.3 %) were male and 24 (22.64 %) were female. Figure 2 illustrates the gender characteristics of the respondents.

DEMOGRAPHIC DETAILS OF EDUCATIONAL QUALIFICATION

Table No. 3: Educational Qualification.

EDUCATIONAL QUALIFICATION	PERCENTAGE
D.Pharm	56.60%
B.Pharm	22.64%
Pharm.D	9.43%
M.Pharm	4.71%

Educational Qualification

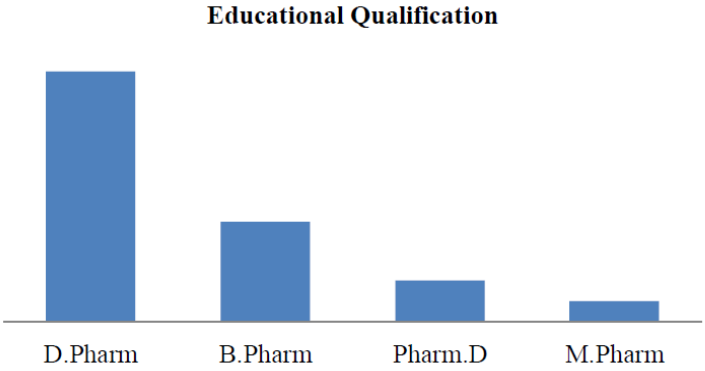

Fig. 3: Educational Qualification.

Table 3 summarizes the educational qualifications of the respondents as obtained from the questionnaire. The respondents were categorized based on their qualifications as D.Pharm 60 (56.60%), B.Pharm 24(22.64 %), Pharm.D 10 (9.433 %), and M.Pharm 5(4.71%). Figure 3 depicts the percentage distribution of educational qualifications among the respondents.

DEMOGRAPHIC DETAILS OF YEARS OF EXPERIENCE

Table No. 4: Years of Experience.

EXPERIENCE	PERCENTAGE
<1year	21.69%
1-5years	55.66%
6-10years	10.37%
>10years	5.66%

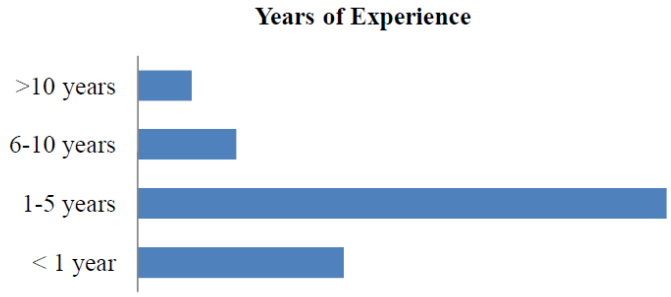

Fig. 4: Years of Experience.

Table 4 presents the distribution of respondents according to their years of experience in community pharmacy practice, based on self-reported questionnaire data. Respondents were categorized into four groups: less than 1 year 23 (21.69 %), 1–5 years 59 (55.66 %), 6–10 years 11 (10.37 %), and more than 10 years 6 (5.66 %). Figure 4 illustrates the percentage distribution of respondents across the experience categories.

KNOWLEDGE TOWARDS MEDICATION DISPENSING ERROR

Table No. 5: Knowledge towards medication dispensing error.

S.NO	QUESTIONS	NUMBERS	PERCENTAGE
1.	Are you aware of the term "Medication dispensing error"? ☐ Yes ☐ No ☐ Not sure	 63 12 24	 59.43% 11.32% 22.64%
2.	Which of the following is considered as a medication dispensing errors? ☐ Dispensing an incorrect drug ☐ Dispensing medicine without patient counseling ☐ Dispensing a medicine to the wrong patient ☐ Dispensing medicine after an interruption or distraction	 54 11 16 18	 50.94% 10.37% 15.09% 16.98%
3.	Which category of medicines may require extra caution during dispensing? ☐ Over-the-counter medicines ☐ Vitamin supplements ☐ Look-alike/Sound-alike drugs ☐ Herbal products	 25 11 57 6	 23.58% 10.37% 53.77% 5.66%
4.	What is the main purpose of reporting dispensing errors in pharmacy care settings? ☐ To reduce the occurrence of dispensing errors ☐ To meet administrative requirements ☐ To enhance patient safety ☐ To improve quality of pharmacy care	 17 10 64 8	 16.03% 9.43% 60.37% 7.54%
5.	Which situations can increase the possibility of a dispensing error? ☐ Unclear prescriptions ☐ Unorganized storage of medicines ☐ Frequent interruptions during dispensing ☐ Dispensing medicines without double-checking	 14 14 42 29	 13.20% 13.20% 39.62% 27.35%

Table No. 6: Hypothesis Testing (Count).

Aware of the term Medication dispensing error	Category of medicines may require extra caution during dispensing				Total
	OTC	Vitamin supplements	Look-alike/Sound alike drugs	Herbal products	
Yes	17	1	45	0	63
No	0	4	2	6	12
Not sure	8	6	10	0	24
Total	25	11	57	6	99

Table No. 7 Chi-Square Tests.

Tests	Value	df	Asymp.Sig.(2-sided)
Pearson Chi-Square	49.72[a]	6	<0.001
Likelihood Ratio	52.83	6	<0.001
Linear-by-Linear Association	18.41	1	<0.001
No of Valid Cases		99	

Chi-square analysis was performed to assess the association between awareness of medication dispensing errors and medicines requiring extra caution. Since the p-value was statistically significant, the null hypothesis was rejected and the alternative hypothesis was accepted.

ATTITUDE TOWARDS MEDICATION DISPENSING ERROR

Table No. 8: Attitude towards medication dispensing error.

S.NO	QUESTIONS	NUMBERS	PERCENTAGE
1.	Community pharmacists should take adequate steps to reduce dispensing errors. ☐ Agree ☐ Disagree ☐ Not sure	 66 17 16	 62.26% 16.03% 15.09%
2.	Faster dispensing should be prioritized even if it increases the risk of errors. ☐ Agree ☐ Disagree ☐ Not sure	 26 59 12	 24.52% 55.66% 11.32%
3.	Mandatory double-checking would significantly reduce dispensing errors. ☐ Agree ☐ Disagree ☐ Not sure	 57 9 33	 24.52% 8.49% 31.13%
4.	Reporting medication dispensing errors helps to improve future pharmacy practice. ☐ Agree ☐ Disagree ☐ Not sure	 76 9 12	 71.69% 8.49% 11.32%
5.	Medication dispensing error is a normal occurrence in pharmacy settings. ☐ Agree ☐ Disagree ☐ Not sure	 23 65 11	 21.69% 61.32% 10.37%

(Hypothesis Testing) Table No. 9 One-Sample Statistics.

Statement	N	Mean	Standard deviation	Standard Error Mean
Adequate steps to reduce dispensing errors	99	2.494949	0.774251	0.0778
Mandatory double-checking to reduce dispensing errors	99	2.484848	0.660297	0.0664

Table No. 10: One-Sample Test.

Statement	Test	df	Sig.(2-tailed)	Mean Difference	95%Confidence Interval of the Difference	
					Lower	Upper
Adequate steps to reduce dispensing errors	6.36	98	< 0.001	0.494949	0.341	0.649
Mandatory double- checking to reduce dispensing errors	7.30	98	< 0.001	0.484848	0.353	0.617

Hypothesis testing showed statistically significant differences regarding adequate steps and mandatory double-checking to reduce medication dispensing errors. Therefore, the null hypothesis was rejected and the alternative hypothesis was accepted.

PRACTICES TOWARDS MEDICATION DISPENSING ERROR

Table No. 11: Practice towards medication dispensing error.

S.NO	QUESTIONS	NUMBERS	PERCENTAGE
1.	Do you review drug–drug interactions before dispensing? ☐ Always ☐ Sometimes ☐ Never	 76 14 9	 71.69% 13.20% 8.49%
2.	Do you provide medication counseling to patients at the time of dispensing?		

	☐ Always ☐ Sometimes ☐ Never	61 30 8	57.54% 28.30% 7.54%
3.	Is the expiry date of medicines verified prior to dispensing? ☐ Always ☐ Sometimes ☐ Never	 54 35 10	 50.94% 33.01% 9.43%
4.	Do you clarify unclear prescriptions before dispensing medicines? ☐ Always ☐ Sometimes ☐ Never	 71 16 12	 66.98% 15.09% 11.32%
5.	Do you dispense medicines without re-checking after an interruption? ☐ Always ☐ Sometimes ☐ Never	 21 24 54	 19.81% 22.64% 50.94%

(Hypothesis Testing) Table No. 12 One-Sample Statistics.

Statement	N	Mean	Standard deviation	Standard Error Mean
Review drug – drug interactions before dispensing	98	2.626	0.722	0.072
Clarify unclear prescriptions before dispensing	98	2.555	0.758	0.076

Table No. 13: One-Sample Test.

Statement	Test	df	Sig. (2-tailed)	Mean Difference	95%Confidence Interval of the Difference	
					Lower	Upper
Review drug–drug interactions before dispensing	8.63	98	0.000	0.626	0.48	0.77
Clarify unclear prescriptions before dispensing	7.28	98	0.000	0.556	0.40	0.71

Hypothesis testing showed statistically significant differences in reviewing drug–drug interactions and clarifying unclear prescriptions before dispensing. Therefore, the null hypothesis was rejected and the alternative hypothesis was accepted.

FACTORS TOWARDS MEDICATION DISPENSINGERROR

Table No. 14: Factors towards medication dispensing error.

S.NO	QUESTIONS	NUMBERS	PERCENTAGE
1.	Which factor is most likely to contribute to dispensing errors in community pharmacies? ☐ High work load and time pressure ☐ Lack of effective double-checking ☐ Interruptions during dispensing ☐ Staff shortage	 24 53 18 4	 22.64% 50.00% 16.98% 3.77%
2.	Which system-related factor can reduce dispensing errors in community pharmacies? ☐ Decreased workload ☐ Following standard operating procedures ☐ Implementation of double-check system ☐ Reduced interruptions during dispensing	 11 26 56 6	 10.37% 24.52% 52.83% 5.66%
3.	Which factor is associated with patient that can increase the chance of dispensing errors? ☐ Incomplete available of patient medication history ☐ Communication barrier between patient and pharmacist ☐ Use of multiple medicine(polypharmacy)	 15 24 52	 14.15% 22.64% 49.05%

	☐ Insufficient time for patient consultation with pharmacist	7	6.60%
4.	Which factor is most commonly associated with mechanical errors in pharmacy dispensing? ☐ Inadequate time for patient counseling ☐ Similar drug names ☐ High workload ☐ Insufficient therapeutic training	 17 60 12 10	 16.03% 56.60% 11.32% 9.43%
5.	Frequent interruptions from the surrounding environment can lead to: ☐ Decreased accuracy in dispensing ☐ Increased number of dispensing errors ☐ Less patient interaction ☐ Reduce Faster dispensing	 19 56 13 11	 17.92% 52.83% 12.26% 10.37%

(Hypothesis Testing)

Table No. 15: Count.

Years of experience	Factor is most commonly associated with mechanical Errors in pharmacy dispensing				Total
	Inadequate time for patient counseling	Similar drug names	High workload	Insufficient therapeutic training	
<1year	4	13	5	1	23
1-5years	8	46	3	2	59
6-10years	3	1	3	4	11
>10years	2	0	1	3	6
Total	17	60	12	10	99

Table No. 16: Chi-Square Tests.

Tests	Value	Df	Asymp.Sig.(2-sided)
Pearson Chi Square	39.62[a]	9	<0.001
Likelihood Ratio	41.08	9	<0.001
Linear-by-Linear Association	6.54	1	0.011
No of Valid Cases		99	

Chi-square analysis was performed to assess the association between years of experience and factors contributing to mechanical dispensing errors. Since the result was statistically significant, the null hypothesis was rejected and the alternative hypothesis was accepted.

4. CONCLUSION

The present study concluded that community pharmacists demonstrated moderate to good knowledge and positive attitudes toward medication dispensing errors. However, dispensing errors were still influenced by workload, interruptions, inadequate double-checking systems, polypharmacy, and look-alike/sound-alike medications. Strengthening medication safety programs, pharmacist training, standard operating procedures, error reporting systems, and communication among healthcare professionals is essential to reduce dispensing errors and improve patient safety in community pharmacy practice.

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