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Pharmacists' perceptions of pharmaceutical services in asthma inhaled medication in Surabaya: A mixed-method study

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ABSTRACT

Understanding pharmacists' perceptions is important because pharmacists play an important role in asthma management. Asthma treatment is divided into controller and reliever, and most asthma treatments are administered via the inhalation route. This study aimed to determine pharmacists' perceptions of pharmaceutical services in asthma inhaled medication in pharmacies in Surabaya. This research is a mixed-method research with an explanatory sequential research design in pharmacies in the city of Surabaya, East Java, from September to November 2017. Sample collection used purposive sampling and was analyzed descriptively. The research sample was 53 pharmacists. Most of the respondents had a high level (41.5%) based on the total questionnaire on the role of pharmacists in pharmaceutical services in treatment with asthma relievers and controller inhalers, while only a few respondents had a very high level (5%). Pharmacists also feel their role in aspects of community pharmacy, such as their role in increasing asthma patient compliance and their role in improving asthma patient control. This can be seen in pharmacists who motivate patients to keep taking the medication so that this can improve asthma patient compliance in using asthma drugs.

INTRODUCTION

Asthma is one of the most common chronic respiratory diseases and is a major public health issue globally, affecting people of all ages, genders, and ethnicities (Massoth *et al*., 2019; Tarraf *et al*., 2018; Quirt *et al*., 2018). Asthma needs serious attention; if it is not prevented and treated properly, it is estimated that there will be an even higher increase in the future and this can interfere with the growth process and quality of life of patients (Dharmage *et al*., 2019). Good asthma therapy treatment is very important in improving and maintaining the quality of life (Stoodley *et al*., 2019). Asthma can persist and interfere with daily activities, which causes loss in quality of life, decreased productivity, increased health costs, risk of hospitalization, and even death (Nunes *et al*., 2017; Stoodley *et al*., 2019).

A study in Asia and Europe found that asthma patients did not pay special attention to their disease and too quickly assumed that it had been controlled. This affects the compliance of asthma patients for control to health facilities and also adherence to taking medications that are in accordance with asthma treatment procedures (Chang *et al*., 2019; Global Initiative for Asthma, 2021). The number of asthma sufferers is increasing due to lack of knowledge and high drug costs (Dharmage *et al*., 2019; Enilari & Sinha, 2019; Nunes *et al*., 2017). This lack of knowledge will increase patient noncompliance in taking drugs and potentially become a barrier to patient recovery (Wong *et al*., 2020). Therefore, asthma knowledge is very important in achieving asthma control because patients can recognize and carry out self-management of asthma effectively so that they can achieve and maintain controlled asthma symptoms and prevent attacks at night and during the day and can perform various physical activities (Mammen *et al*., 2018; Nguyen *et al*., 2018).

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Asthma treatment is divided into controller and reliever. Asthma medications that are used routinely to prevent asthma, reduce inflammation, control symptoms, and reduce future risks such as exacerbations and decreased lung function and are used daily to keep asthma under control are called controllers. In contrast to relievers, which are only used in an asthma attack, the importance of controlling it is to reduce symptoms and the patient's risk of having an asthma attack which causes a high risk of death (Global Initiative for Asthma, 2021). Excessive use of relievers or using them at increased doses can result in asthma getting worse and worse (Global Initiative for Asthma, 2021; Kaplan *et al*., 2020; Quirt *et al*., 2018).

Most asthma treatments are administered via the inhalation route because the inhalation route provides faster onset of action and has better efficacy (Borghardt *et al*., 2018). Errors in the use of inhalers were one contributor to poor control of asthma patients (Usmani *et al*., 2018). If the patient is comfortable using an inhaler correctly, then effective asthma control can be achieved because an improper inhaler technique reduces drug delivery to the airways, thereby reducing the effectiveness of the inhaler medication, which can result in poor asthma control (Jahedi *et al*., 2017). Research on inhalers in patients showed that the absence of prior instructions regarding inhaler use could lead to inadequate use technique (Jahedi *et al*., 2017).

Pharmacists play a role in providing drugs and recommendations in selecting the right drug based on the patient's condition obtained from the results of counseling with pharmacists and the results of diagnoses from doctors (Lorensia *et al*., 2017, 2020, 2021). Understanding pharmacists' perceptions was important because pharmacists play an important role in asthma management, such as disease management, medication management, and patient monitoring, as well as saving health costs (Lorensia *et al*., 2021). The importance of this perception is due to the patient's lack of knowledge about the management of asthma and poor asthma control behavior which becomes a barrier to the success of asthma treatment (Lorensia *et al*., 2020; Majellano *et al*., 2019). Pharmacists assume that their role has been carried out well, although not all patients receive the same asthma treatment education. This can be seen in pharmacists who only provide education to patients who have recently used the drug and assume that patients who have been on treatment for a long time must be right in using their drugs (Jalmav *et al*., 2021).

This research was a mixed-method research with quantitative and qualitative approaches, with a phenomenological approach. Previous research in Surabaya city showed that most patients who were prescribed inhaled drugs do not use their inhalers properly. In one clinical study, 90% of the patients demonstrated an incorrect technique in the use of metered-dose inhalers (MDIs) (Lorensia *et al*., 2018) and dry powder inhalers (DPIs) (Lorensia *et al*., 2016, 2019). There were considerable differences in the lung deposition achieved with certain types of devices. Usually, the number of particles reaching the target location ranges from 8% to 60% with MDIs and about 10 to more than 40% with DPIs (Lorensia *et al*., 2019). The role of pharmacists was very influential for asthma patients, so this study aimed to determine how pharmacists perceive pharmaceutical services in treating asthma reliever inhalers at pharmacies in Surabaya, which was intended so that pharmacists can play their maximum role in treating patients in pharmaceutical services.

METHOD

Research design

This research was a mixed-method research with quantitative and qualitative approaches complementing the description of the study results regarding the phenomenon under study to strengthen the research analysis. This research design used a sequential explanatory model or combined quantitative and qualitative research methods sequentially. The location was chosen in pharmacies that practice pharmacy in Surabaya city, East Java, from September to November 2017. This study was approved with Ethical Test No. 024/KE/V/2017 at the Universitas Surabaya.

Quantitative phase

The quantitative study used a survey research method that aimed to determine the role of pharmacists in pharmaceutical services in the treatment of asthma with inhalers at pharmacies in Surabaya. The data collection method in this study was using a questionnaire in the form of a scale obtained from previous research (Kritikos *et al*., 2010).

Qualitative phase

The qualitative research was conducted using the interpretative phenomenological analysis research method, which aimed to determine the pharmacists' perceptions of pharmaceutical services in treatment with asthma inhalers at pharmacies in Surabaya. The interview method used in this research was the in-depth interview method. The data analysis technique in this research was thematic analysis, such as factor analysis.

Population and sample

In this study, the research target population were the pharmacists who work in pharmacies in Surabaya City. The research sample were pharmacists who worked in pharmacies in Surabaya city, who met the sample criteria, and were willing to participate in the research. The criteria were pharmacists who represent one pharmacy who were willing to fill out the informed consent and stand by at the pharmacy for at least 8 h/day for five working days and who work in pharmacies that sell inhaler preparations.

In this study, sampling was carried out using the purposive sampling technique. Determination of the sample size was determined based on a feasibility study that was carried out by researchers to determine the total affordable population. Based on data from the Surabaya City Health Office in 2013 data on pharmacies in the Surabaya city area, there are 869 pharmacies. From a total of 869 existing pharmacies, it was known that the number of members of the affordable population was 114 pharmacists representing 1 pharmacy. Based on the number of pharmacies, with a margin of error (5%) and confidence level (95%), the calculation of the minimum sample size used the formula $n = [p.q.N.Z^2]/[d^2.N + p.q.Z^2]$, where n = number of samples; $p = q = 0.5$; N = population (114), d = degree of accuracy (0.1), and z = standard deviation of normal according to the 95% significance level was 1.96. From the results of the calculation of

the sample size above, the minimum sample for this study was 52 pharmacists, where each pharmacist represented the pharmacy where they work and one pharmacy can only be represented by one pharmacist. Of the 869 pharmacies that had been previously investigated by the researcher, there were 609 pharmacies with pharmacists who were not on standby at the pharmacy, 64 pharmacies were not operating, 19 pharmacies did not serve the public, and 63 pharmacies refused.

Data collection and analysis method

Distribution of informed consent and interview using the in-depth interview method used structured and semi structured interview guides.

Validation of the questionnaire was carried out by equating the meaning and assessment of each statement on the questionnaire. The questionnaire was translated into the Indonesian language. Language validation was carried out by submitting the translation results to three expert judges from community pharmacists. The suitability score was then validated using the content validity ratio (CVR) and was declared valid if CVR was >0.29. Interviews were made with the framework of thinking as in Table 1 (Nos. 1–3 (Global Initiative for Asthma, 2021; Jahedi *et al*., 2017; Kaplan *et al*., 2020; Tavakoli *et al*., 2018); Nos. 4–6 (Banjari *et al*., 2018; Clark *et al*., 2019; Fernandes *et al*., 2018; Kuti *et al*., 2017; Nguyen *et al*., 2018); Nos. 7–8 (Atif *et al*., 2020; Bobbins *et al*., 2020); Nos. 9–10 (Carvajal and Popovici, 2018; Chogtu *et al*., 2017; Dalton and Byrne, 2017). The construct validity (CV) test used factor analysis with the exploratory factor analysis (EFA) system to find factor loads in the relationship between the dimensions (factors) and items. The reliability test was conducted to determine the instrument; if Cronbach's alpha value >0.7, then it was reliable.

The overall interpretation of the analysis was the analysis of the interpretation of the quantitative and qualitative results, namely by combining the results from the quantitative phase and the qualitative phase of the research into the overall results of the study so that a unified conclusion was obtained.

RESULTS

Research implementation

A total of 114 pharmacists were an affordable population who met the inclusion criteria of the study sample. A total of 53 pharmacists were sampled and were willing to take part in the study. Of the 53 respondents, all of them filled out the questionnaire as part of the quantitative phase of the study, but only 12 respondents were willing to continue the in-depth interviews, which were part of the qualitative phase of the study.

Characteristics of respondents

Among the 53 pharmacists, 90.57% were female and 9.43% were male. The age range of most participants was 26–35 years. An apothecary management apothecary [*Apoteker Pengelola Apotek* (APA)] is a pharmacist who can operate a pharmacy in one place, while a companion pharmacist [*Apoteker Pendamping* (APING)] is a pharmacist who replaces the APA at certain hours during the operating hours of a pharmacy. Most of the respondents were APA (92.45%) (Table 2).

Pharmacists practice pharmacy that provides various types of inhaler preparations, namely the MDI. This was because MDI preparations were more familiar and their price was more affordable. The most common type of reliever was salbutamol MDI (66.04%), while the most common type of controller was a combination of salmeterol and fluticasone MDI (66.04%) (Table 3).

Table 1. Interview guidelines for pharmacists' perceptions of their role in pharmaceutical services in treatment with asthma inhalers.

No.	Questionnaire	Question	Question purpose
1	Frequency of using inhaler reliever (asthma reliever medication) and controller (asthma control medication)	1. Use of reliever and controller	To determine the use of relievers and the impact of excessive use of reliever inhalers (Global Initiative for Asthma, 2021; Jahedi *et al*., 2017; Kaplan *et al*., 2020; Tavakoli *et al*., 2018).
2	Frequent/overuse of relievers (asthma relievers) and controllers (asthma control medications)	2. Impact of using reliever and controller	
3	Patient self-monitoring of asthma control (based on symptoms or peak flow measurement)		
4	Asthma trigger factors and prevention strategies	3. Patient understanding of asthma prevention	To determine the factors associated with asthma (Clark *et al*., 2019; Fernandes *et al*., 2018; Kuti *et al*., 2017), and to determine the relationship between the level of asthma control and knowledge about asthma (Banjari *et al*., 2018; Nguyen *et al*., 2018).
5	Current level of control of asthma patients		
6	Have an action plan	4. The relationship between asthma control level and asthma knowledge	
7	Techniques for using inhaler preparations that have been used regularly	5. The role of pharmacists in the treatment of asthma patients	To find out the pharmaceutical services performed by pharmacists in pharmacies (Atif *et al*., 2020; Bobbins *et al*., 2020).
8	Patient self-management of asthma (ie: recognizing when and knowing how to take action when asthma worsens)	6. Pharmaceutical services for asthma patients	
9	Lack of adherence to relievers (asthma relievers) and controllers (asthma controller medications)	7. Low adherence of asthma patients	This study aims to determine the impact of low asthma medication adherence (Pearce and Fleming, 2018), and to determine the causes and effects of improper use of inhalers (Chogtu *et al*., 2017).
10	Techniques for using an inhaler when an inhaler is first prescribed	8. Causes and effects of improper use of inhalers	

Instrument validity test

The validity test was the level of reliability and validity of the instrument or measuring instrument used. The CVR was the accuracy of a measuring instrument in terms of the content of the measuring instrument through rational analysis by expert judgment. The results of the data validity test showed that items 1–10 were valid [CVR value = 0.75(>0.29)], so the questionnaire could be used as a measuring tool (Table 4).

CV was used using factor analysis with the EFA system to look for the loading factor which is the relationship between dimensions (factors) and items. The condition of the loading factor was >0.5. The results of factor analysis showed the following values:

a. The sample sufficiency test was conducted using Kaiser–Meyer–Olkin (KMO) and a measure of sampling adequacy (MSA), provided that the KMO value was >0.5. The results showed KMO and MSA values for the correlation between variables in the KMO, and Bartlett's test box showed a value of 0.661 which was >0.5. Meanwhile, the significant result from Bartlett's test of sphericity was 0.000. Based on the results above, it can be concluded that this instrument met the valid requirements, so the data was eligible for further factor analysis.
b. The item independence test was used to test each item in the questionnaire, provided that the anti-image correlation value was >0.4. The results of the analysis test showed that the correlation value of each item was as follows: item 1 = 0.685, item 2 = 0.553, item 3 = 0.598, item 4 = 0.581, item 5 = 0.715, item 6 = 0.634, item 7 = 0.641, item 8 = 0,800, item 9 = 0.767, and item 10 = 0.654. The results showed that the correlation between the independent variables of each item was classified as high, namely all items had an anti-image correlation data value >0.4 so that, based on the results of item validity testing, it can be concluded that all items were valid and all independent variables could be analyzed further.
c. The exploratory factor analysis was carried out to find the loading factor, which is the relationship between dimensions (factors) and items. The provisions were that the loading factor was >0.5. The following was the loading factor from items 1 to 10. Two items did not meet the loading factor (loading factor <0.5), namely items 4 and 10; the two items would still be analyzed with consideration of CVR and reliability. The following results of the exploratory factor analysis can be seen in Figure 1.

Figure 1 shows the dimensions (factors) with eigenvalues >1, which means there were four dimensions (factors) formed. The results of the exploratory factor analysis in the graph showed that four factors made up the pharmacist's perception of their role in pharmaceutical services in treatment with asthma reliever inhalers. There were no double-loaded loading factors or values indicating that there were items that have the same dimensions; this indicates that there were four dimensions or four factors of pharmacist perception of their role in pharmaceutical services in treatment with asthma reliever inhalers. There were four dimensions or factors and the members contained in them.

The DI was the distinguishing power of the item, namely the ability of the item to distinguish a sample that had high and low score groups. There are many ways to calculate the discrimination index. The technique used in this study was to use the product–moment Pearson correlation between items and the total. Good items were items that had item correlation – a total of >0.3. The results of the discrimination index test showed that, from a total of 53 samples, all items had good discrimination with an average significance of 0.000 and the total item correlation value was >0.3.

Instrument reliability test

The reliability test was conducted to determine whether the instrument, in this case, the questionnaire, could be used more than once to produce data that was consistent with the condition that Cronbach's alpha was >0.7. From the item reliability test with Cronbach's alpha, the results of the reliability test showed a value

Table 2. Frequency distribution based on characteristics of respondents.

Characteristics of respondents		Frequency (*n*: 53)	Percentage (%)
Gender	Male	5	9.43
	Female	48	90.57
Age (years)	17–25	2	3.77
	26–35	41	77.36
	36–45	9	16.98
	46–55	1	1.89
Position	APA	49	92.45
	APING	4	7.55

Table 3. Frequency distribution based on inhaler preparations available in pharmacies.

Type of inhaler	Active ingredients	Pharmacy frequency (*n*: 53)	Percentage (%)
Reliever	Salbutamol MDI	35	66.04
	Ipratropium bromide MDI	4	7.55
	Metaproterenol sulfate MDI + salbutamol MDI	9	16.98
	Salbutamol MDI + ipratropium bromide MDI + fenoterol MDI	5	9.43
Controller	Salmeterol + fluticasone propionate MDI	35	66.04
	Beclomethasone dipropionate MDI	10	18.87
	Fluticasone propionate MDI	8	15.09

Information: classification of pharmacies where pharmacists run pharmaceutical services that provide inhalers based on research SOPs.

Table 4. Results of the content validity ratio (content validity ratio) questionnaire.

Item	Question	CVR					CV				Discrimination index (DI)		
		Ne	*N*/2	*N*−1	CVR	Description	Loading factor	Description	Dimension (factor)	Dimension	Pearson correlation	Sig (*N* = 53)	Description
1	Frequency of using an inhaler reliever (asthma reliever medication) and controller (asthma control medication)	3	1.5	2	0.75	Valid	0.672	Valid	1	Asthma monitoring	0.572	0.000	Good discrimination
2	Frequent/overuse of relievers (asthma relievers) and controllers (asthma control medications)	3	1.5	2	0.75	Valid	0.544	Valid			0.426	0.001	Good discrimination
3	Patient self-monitoring of asthma control (based on symptoms or peak flow measurement)	3	1.5	2	0.75	Valid	0.420	Valid			0.470	0.000	Good discrimination
4	Asthma trigger factors and prevention strategies	3	1.5	2	0.75	Valid	0.500	Valid	2	Asthma control	0.566	0.000	Good discrimination
5	The current level of control of asthma patients	3	1.5	2	0.75	Valid	0.565	Valid			0.677	0.000	Good discrimination
6	Have an action plan	3	1.5	2	0.75	Valid	0.631	Valid			0.677	0.000	Good discrimination
7	Techniques for using inhaler preparations that have been used regularly	2	1.5	2	0.75	Valid	0.690	Valid	3	Asthma management	0.597	0.000	Good discrimination
8	Patient self-management of asthma (ie: recognizing when and knowing how to take action when asthma worsens)	2	1.5	2	0.75	Valid	0.726	Valid	3		0.657	0.000	Good discrimination
9	Lack of adherence to relievers (asthma relievers) and controllers (asthma controller medications)	2	1.5	2	0.75	Valid	0.588	Valid	4	The technique of using an inhaler	0.511	0.000	Good discrimination
10	Techniques for using an inhaler when an inhaler is first prescribed	2	1.5	2	0.75	Not valid	0.298	Not valid	4		0.482	0.000	Good discrimination

CVR = Content validity ratio (Ne–*N*/2)/(*N*−1);
Ne: 1–3 (number of expert judges who gave an assessment) (agree/strongly agree);
N: 3 (sum of all expert judges).

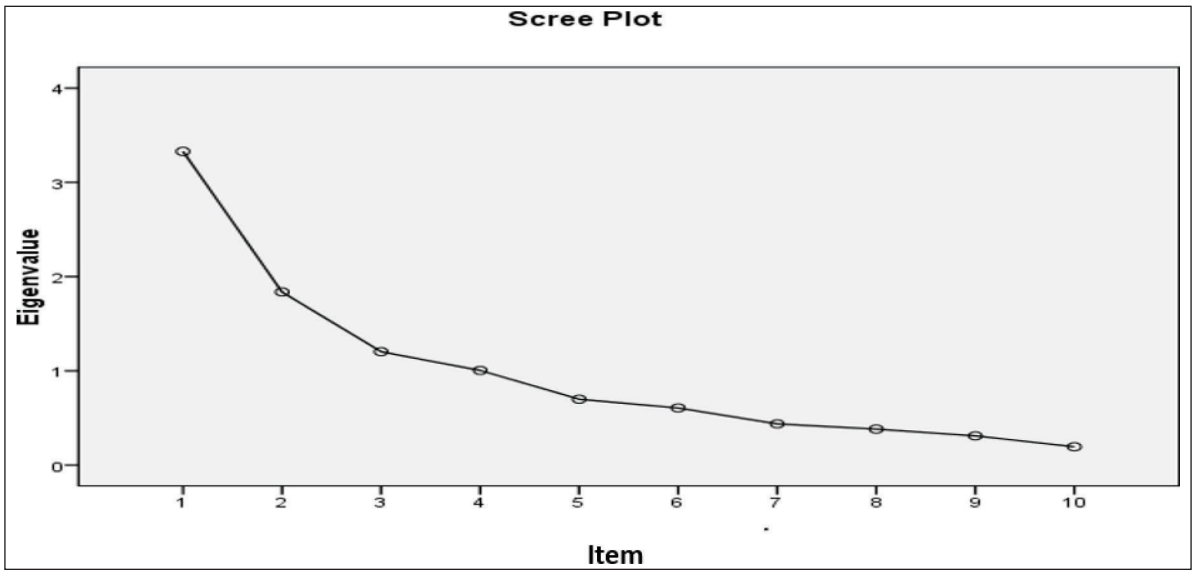

Figure 1. Scree plot graph of the relationship between items and Eigen dimensions (factors).

of 0.750, so it can be said that the items in the questionnaire were reliable or reliably used in data collection tools.

Quantitative phase

Descriptive statistics are part of the statistical science that only collects, processes, presents, and analyzes quantitative data descriptively without making decisions for the population or just looking at the general picture of the data obtained. The average item score per dimension in the pharmacist's role questionnaire on pharmaceutical services in treatment with asthma reliever inhalers is shown in Figure 2; item 8 was the lowest item with a mean value of 3.51, and this showed that they had a smaller role in item 8.

The total category of the pharmacist's role questionnaire on pharmaceutical services in treatment with asthma reliever and controller inhalers in Table 5 showed the frequency and percentage that are evenly distributed. All research samples answered all the items in the questionnaire, with the highest category being in the high category with a frequency of 22 pharmacists (41.5%) and the least category being in the very high category with a frequency of 5 pharmacists (5%).

Dimension 1 category related to asthma monitoring, with the most category being the low category with a frequency of 38 pharmacists (71.7%). Dimension 2 categories related to asthma control, with the most category being the high category with a frequency of 22 pharmacists (41.5%). Dimension 3 categories related to asthma management, with most categories being in the high category with a frequency of 32 pharmacists (60.4%) with a frequency of 4 pharmacists (7.5%). Dimension 4 categories related to inhaler use techniques, with the most categories being in the low category with a frequency of 26 pharmacists (49.1%) (Table 6).

Qualitative phase

The results of this study were obtained by using in-depth interviews with informants as a form of searching for data and direct documentation in the field, which were then analyzed by researchers. In this analysis, the focus of the research was pharmacists who carry out pharmaceutical practices in pharmacies in the Surabaya city area, which were linked by researchers to several elements or problem identification. This study was obtained from various additional information obtained through in-depth interviews to see the response of the research focus on asthma treatment in everyday life. After conducting interviews with the research subjects, the researcher then made a transcript of the interviews and summarized them in a table to further understand the interview theme to match the research title. The results of the interview findings can be seen in Table 7. Descriptive analysis of research data was an analysis of the data obtained from interviews with 12 research subjects, 11 APA and 1 APING, who perform pharmaceutical services at pharmacies in the city of Surabaya.

DISCUSSION

This research used mixed methods which were carried out simultaneously to complement the description of the study results regarding the phenomenon under study to strengthen the research analysis. The study obtained samples that met the inclusion criteria, namely 114 pharmacists. The research sample in this study consisted of 5 men (9%) and 48 women (91%). There have been more women than men over the past 20 years (Carvajal and Popovici, 2018).

a) **Dimension 1** (asthma monitoring). There was a research sample of 38 pharmacists (71.7%) in the low category. Various obstacles to providing asthma counseling including pharmacist time, lack of asthma knowledge, and factors related to patients who did not have confidence in pharmacists were barriers to asthma monitoring (Kritikos *et al*., 2010). Pharmacists should monitor and evaluate to determine the effect of therapy, be aware of drug side effects, and ensure patient compliance. The pharmacist's role was to ensure that the patient had sufficient understanding, knowledge, and skills to follow the treatment regimen and monitoring plan (Dalton & Byrne, 2017).

b) **Dimension 2** (asthma control). There was a research sample of 22 pharmacists (41.5%) in the high category. Pharmacists feel that their role is very important in

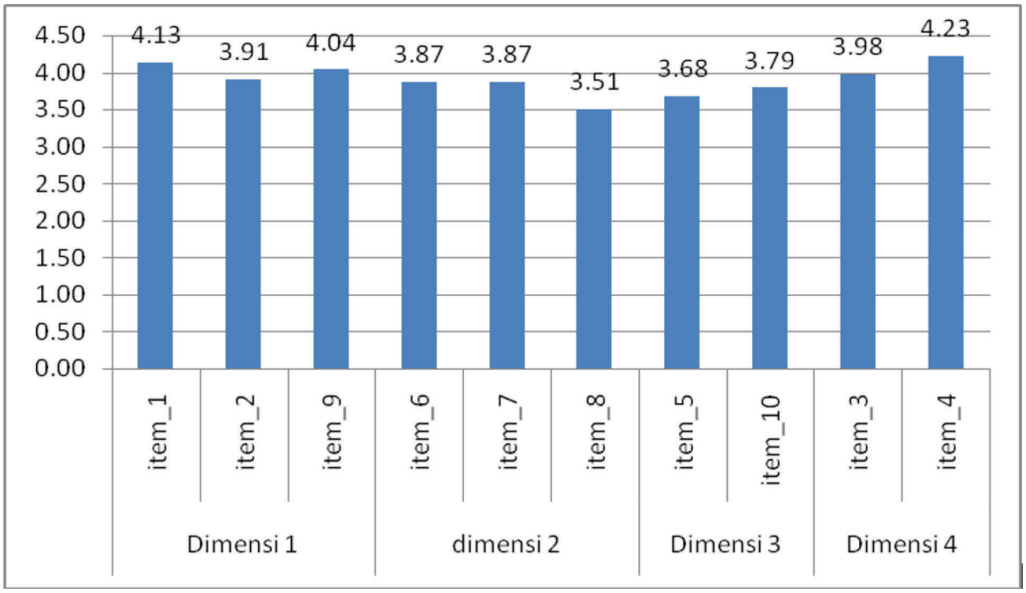

Figure 2. Graph of the average item score per dimension.

Table 5. Categories of total questionnaires (role of pharmacists in pharmaceutical services in asthma management with inhalers).

Category	Interval	Frequency (*n*: 53)	Percentage (%)
Very low	< 35,12	12	22.6
Low	35,13–39,00	14	26.4
High	39,01–42,88	22	41.5
Very high	> 42,89	5	9.4

Table 6. Dimensions of pharmacists' perceptions of pharmaceutical services in the treatment of asthma with inhaler preparations.

Dimension (factor)	Dimension	Category	Interval	Frequency (*n*: 53)	Percentage (%)
1	Asthma monitoring	Very low	<10.78	4	7.5
		Low	10.79–12.08	38	71.7
		High	12.09–13.37	5	9.4
		Very high	>13.38	6	11.3
2	Asthma control	Very low	<9.50	7	13.2
		Low	9.51–11.25	18	34.0
		High	11.26–12.99	22	41.5
		Very high	>13.00	6	11.3
3	Asthma management	Very low	<5.91	9	17.0
		Low	5.92–7.47	8	15.1
		High	7.48–9.04	32	60.4
		Very high	>9.05	4	7.5
4	The technique of using an inhaler	Very low	<7.11	8	15.1
		Low	7.12–8.21	26	49.1
		High	8.22–9.31	13	24.5
		Very high	>9.32	6	11.3

Table 7. Pharmacists' perceptions of their role in pharmaceutical services in asthma treatment.

Answer finding	Excerpts of interview results
The role of pharmacists in the treatment of asthma is very necessary to reduce costs (Cost Effectiveness)	"Can reduce the costs incurred, thirdly ... with patient compliance, the patient does not have to go back and forth to the pharmacy, to the doctor to check what his asthma is like, this is much more profitable for the patient because the cost to go here will be much more reduce"
	"What is clear is that the first time they got my recipe here, or my friends here, they must have asked whether they have used it or not? Now that's what we usually have to educate first but it depends on the patient if he doesn't know"
	"We'll tell you how to use it and what are the effects if you don't use it... if you don't follow the rules for use, what... how to use it"
	"The importance of counseling on how to use the inhaler properly and correctly and the dosage and use rules must be adhered to"
	"It's the pharmacist who has to ask...ehh, he has to tell me how to use it, what should he give?"
The role of pharmacists is very important in educating patients about how to use drugs (Patient Education Services)	"Yes, at least we will tell you how to use it, then when to use it"
	"Explain for example how to use inhaler preparations to asthma patients"
	"Especially the reminder for the problem of using the asthma device"
	"We are important for what it's called... giving instructions on how to use it, then if he forgets to use it how and when a sudden attack occurs"
	"If it is necessary to educate the patient, especially how to use the tool"
	"I'll tell you how to use it, then what is the way of storing it maybe, then the dosage, when to use it"
	"If he is a new patient using an inhaler who doesn't understand how to use it, now there are some medicines that have been inhaled, they feel the medicine is not coming out, that's what needs to be informed"
	"It's important, madam, especially in providing counseling on the use of inhalers"
	"It's the pharmacist's job to explain how to use it"
The role of the pharmacist so far has been in terms of monitoring the use of drugs to check the patient's condition (Patient Monitoring Role)	"Usually they come back in about 15 days to ask for the medicine, now that's what we are monitoring, sir, this is the only medicine left, how much do you have left?, how about your compliance, sir?. Usually we ask there.. so every time they repeat. Usually we ask things like: how are you, sir, are you feeling better?, is it reduced or not?"
	"…right, usually someone is supposed to use the inhaler once, spray it once, so he uses it 2–3 times to make it quick, now that might be more of a side effect and maybe use it incorrectly, so it must be monitored"
The role of pharmacists in treating asthma is very important, but because patients feel they already understand how to use drugs, it is difficult for pharmacists to carry out their roles properly (False Belief Patient Assumption)	"Usually, at the pharmacy, we want to provide pharmaceutical services... that's the patient, sometimes we tend to ask questions, he already said he knew how to use it"
	"Hmm sometimes if he has had asthma for a long time... that's right sometimes I like to be inconsequential, I mean inconsequential, I like to treat myself, so I feel like I can do it"
	"Sometimes that person has never used it but his relatives or friends have already told him how to use it"
	"From our point of view, we want to give KIE, they already understand in terms of its use"
	"Usually we ask first how to use it and for how long? have you checked again?"
	"..he can control himself so that his asthma doesn't come back often, so it can improve the patient's quality of life too, right?"
The role of pharmacists in improving asthma patient control in asthma treatment.	"If the patient knows the ways he can control his own asthma, of course he will become less dependent on the drug itself. So the term is yes.. his quality of life is getting better, so that person with him prevents his asthma"
	"Yes, if for example he is aware of his condition, how severe the level of his asthma later will automatically increase the level of control for him who is aware"
	"I think if the patient really understands about asthma, whether it's the cause, how to handle it, I think he can control his asthma well"
	"…his asthma is getting out of control, everywhere he can relapse if he doesn't comply with the reliever medication, Ms."
	"If an asthma patient, hmm, does he really need disciplined treatment, yes, if he is outside the specified schedule, he is not disciplined, of course his asthma is getting worse so that the frequency with which he uses drugs should actually be more and more disobedient"
The role of pharmacists to improve patient compliance is considered low in asthma treatment	"Relapses are more frequent. Then, hmm.. the dose can be even higher, the same can be even more"
	"Low compliance? In my opinion, if he doesn't obey, it's usually because he forgets, then he feels he is healthy, maybe that's the case. Yes, we communicate that even though he is not in a relapse condition, yes, we are motivated to keep taking medication regularly. Because suddenly it happened hmm.. what's the name, like allergens that hit him later will be more so and so.. difficult."
	"That's usually like this, the possibility of frequent attacks, hmm, low compliance means disobedience, maybe the medicine that should be taken is like the one that should contain a controller or the controller that is not used often, maybe it's the corticosteroid which is usually supposed to be used often, if so not used can often occur attacks"

controlling patients' asthma; asthma control carried out by pharmacists can lead to better asthma control and can improve quality of life and reduce costs of hospital care and doctor visits (Bridgeman & Wilken, 2021; Deeks *et al*., 2018). Knowledge of asthma was related to asthma control behavior. Factors related to whether asthma was controlled or not were regular control behavior, the accuracy of the type of drug, the dose of the drug, and the accuracy of the inhalation technique (Azzi *et al*., 2017). Asthma control aims to eliminate and control asthma symptoms to minimize symptoms of asthma exacerbations and improve and maintain lung function as optimally as possible, avoiding drug side effects (Global Initiative for Asthma, 2021). The pharmacist's role, in this case, is to educate patients by providing information about the type and purpose of asthma treatment, as well as demonstrating the correct use of inhalers, providing information about the use of other asthma devices in the treatment of asthma, asking patients about asthma plans/actions, and monitoring drug use by patients (Bridgeman *et al*., 2021; Deeks *et al*., 2018; Global Initiative for Asthma, 2021).

c) **Dimension 3** (asthma management). There were research samples of 32 pharmacists (60.4%) in the high category. From the results of the dimension test regarding asthma management, pharmacists feel that it is very important for them to be involved in asthma management. In the management of asthma, pharmacists play a role in detecting, preventing, and overcoming drug-related problems that may arise (Bridgeman *et al*., 2021). The importance of the pharmacist's role in the management of asthma, such as providing information and counseling to patients, aims to make patients better understand treatment to improve their adherence and quality of life. In addition, pharmacists play a role in providing drugs and providing recommendations in choosing the right drug based on the patient's condition obtained from the results of counseling with pharmacists and the results of diagnoses from doctors (Bridgeman *et al*., 2021; Deeks *et al*., 2018; Global Initiative for Asthma, 2021).

d) **Dimension 4** (technique of using inhaler). There were 26 pharmacists (49.1%) in the research sample in the low category. Pharmacists play an important role in providing information about the technique of using inhalers. A previous study showed that pharmacists lacked knowledge about the use of inhalers, so it was dangerous for patients to get the wrong information (Azzi *et al*., 2017; Bridgeman *et al*., 2021; Deeks *et al*., 2018; Global Initiative for Asthma, 2021). The role of pharmacists in the use of inhaler techniques can lead to better drug therapy, reduced health costs, and better asthma control in asthmatic patients (Bridgeman *et al*., 2021; Deeks *et al*., 2018; Global Initiative for Asthma, 2021; Lorensia *et al*., 2017).

The difference obtained in this study with the research conducted by Kritikos *et al*. (2010), namely the dimensions (factors) that are formed. In this study, pharmacists felt their role in pharmaceutical services in treatment with asthma reliever inhalers along with four main dimensions (factors), namely asthma monitoring, asthma control, inhaler use techniques, and asthma management. Meanwhile, in a study conducted by Kritikos *et al*. (2010), pharmacists felt their role in asthma management along with three main dimensions (factors), namely patient self-management, drug use, and asthma control. In Indonesia, Surabaya city to be precise, a study to increase pharmacist knowledge about how to use inhalers was carried out by Lorensia *et al*. (2017); of the 609 pharmacists visited in Surabaya, only about 25% were willing to attend education until the end. A total of 71 community pharmacists were willing to fill out the initial questionnaire and preliminary study, and 42 pharmacists refused to be given the intervention. Most of the pharmacists who reasoned that they could not continue their research admitted that they were interested in providing education (involved in research) but because of their busy work and difficulties in arranging meeting schedules, they could not continue research. Research by Lorensia *et al*. (2020), who wanted to explore more the barriers to pharmaceutical services for asthma treatment in pharmacies in the Surabaya area, said that pharmacists in asthma pharmaceutical services still had obstacles, namely lack of confidence in skills and counseling for patients. This is admittedly because pharmacists feel they have limited time to review counseling materials related to asthma treatment, including how to use inhalers.

CONCLUSION

The total category of the pharmacist's role questionnaire on pharmaceutical services in treatment with asthma reliever and controller inhalers showed the highest category being in the high category with a frequency of 22 pharmacists (41.5%) and the least category being in the very high category with a frequency of 5 pharmacists (5%).

Pharmacists consider that their roles have been carried out well so far, such as roles related to clinical pharmacy aspects carried out by pharmacists in pharmacies, such as reducing costs in asthma treatment, monitoring/monitoring asthma treatment, and providing information on how to use drugs. Pharmacists also feel their role in aspects of community pharmacy, such as their role in increasing asthma patient compliance and their role in improving asthma patient control. This can be seen by pharmacists who motivate patients to keep taking the medication, and so this can improve patient adherence to using asthma drugs. However, the role of pharmacists cannot be seen in daily practice because of several obstacles that make it difficult for pharmacists to carry out their role in pharmaceutical services, including patients who already understand how to use drugs so that pharmacists assume that patients understand and are reluctant to provide pharmaceutical services. Pharmacists should provide information and education to patients regardless of whether the patient is an old patient, a new patient, a patient who already understands asthma treatment, or a patient who does not understand asthma treatment so that patients better understand the treatment regimen given so that the patients can play a more active role in treatment, and this can improve adherence to using drugs.

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CONFLICTS OF INTEREST

The authors report no financial or any other conflicts of interest in this work.

AUTHOR CONTRIBUTIONS

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work. All the authors are eligible to be an author as per the international committee of medical journal editors (ICMJE) requirements/guidelines.

ETHICAL APPROVALS

This study was approved with Ethical Test No. 024/KE/V/2017 at the Universitas Surabaya.

DATA AVAILABILITY

All data generated and analyzed are included within this research article.

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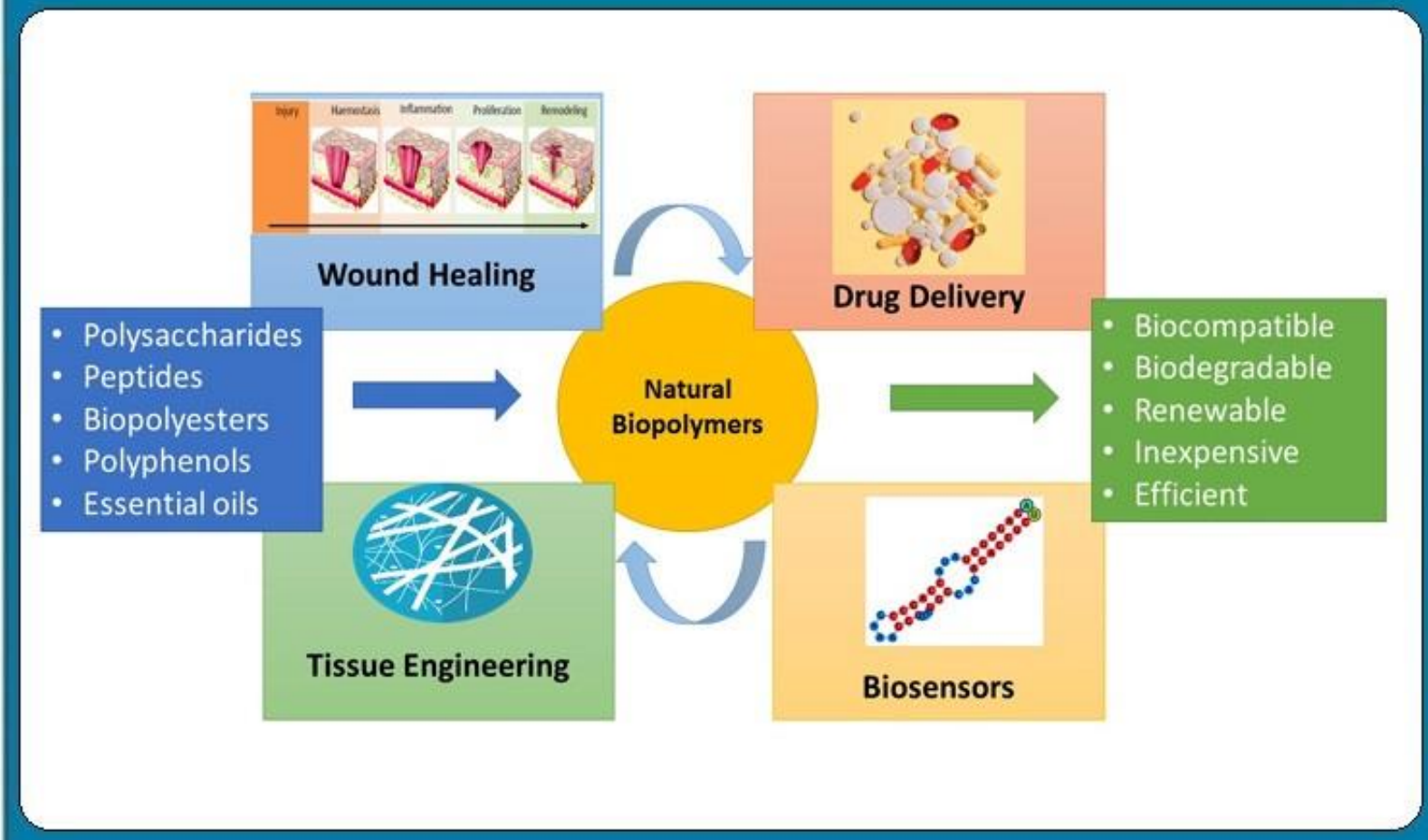

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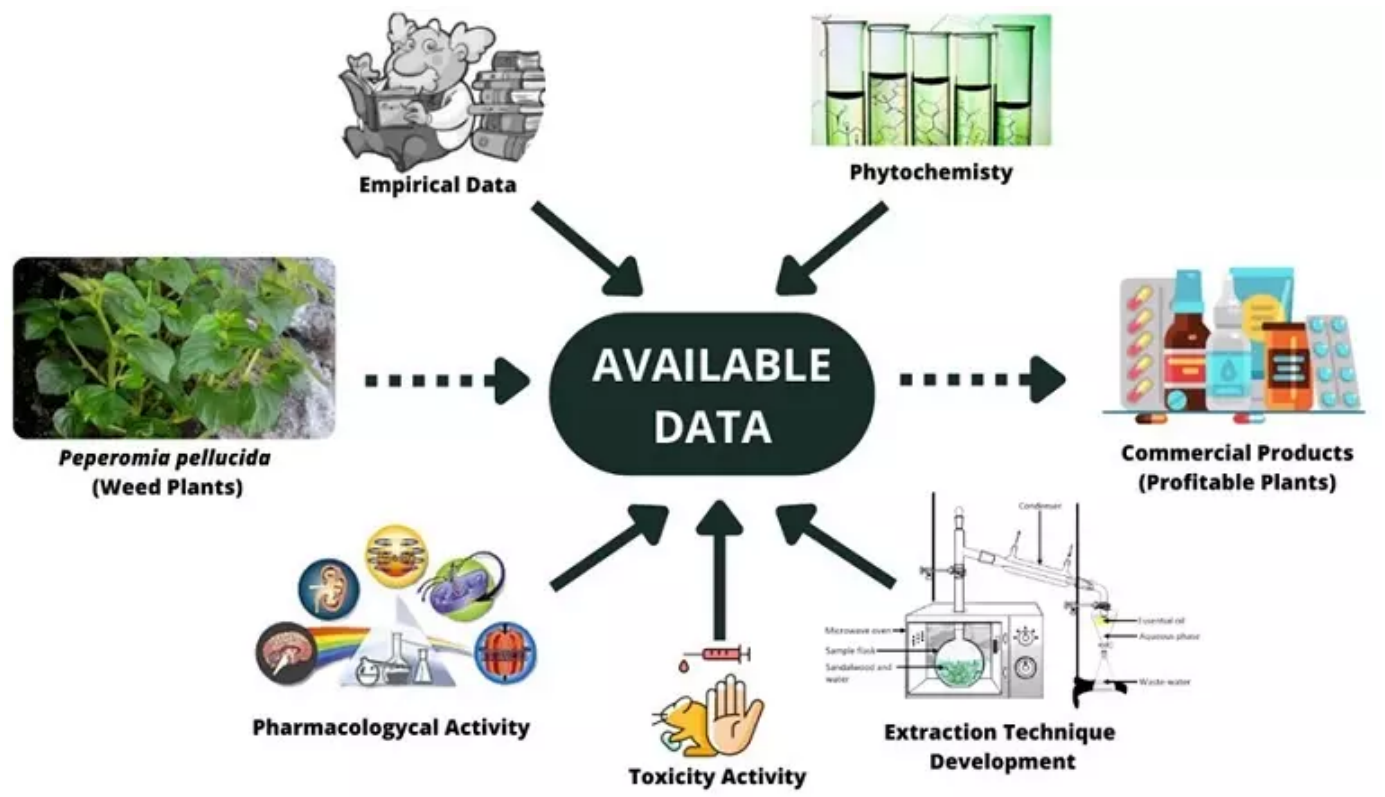

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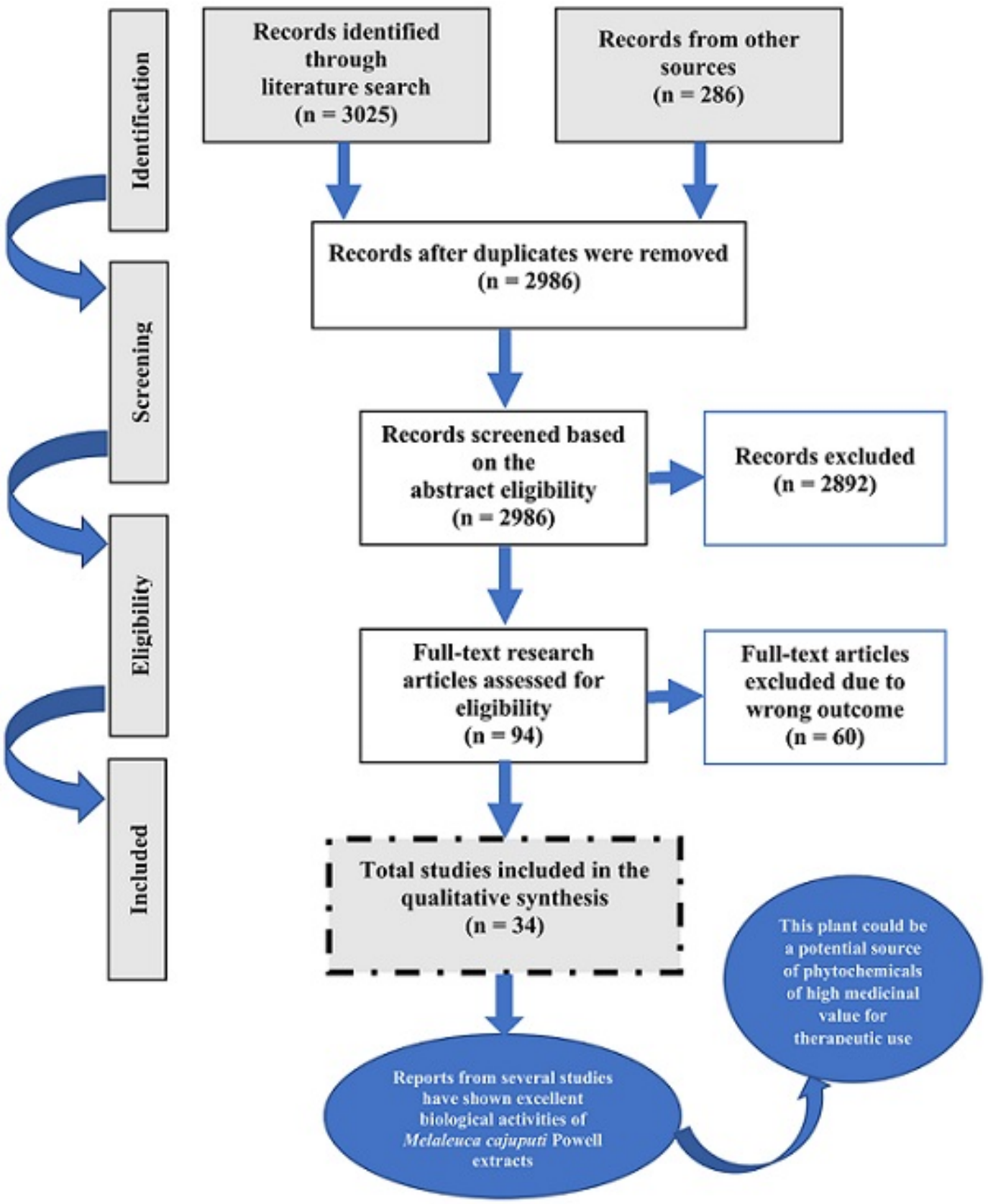

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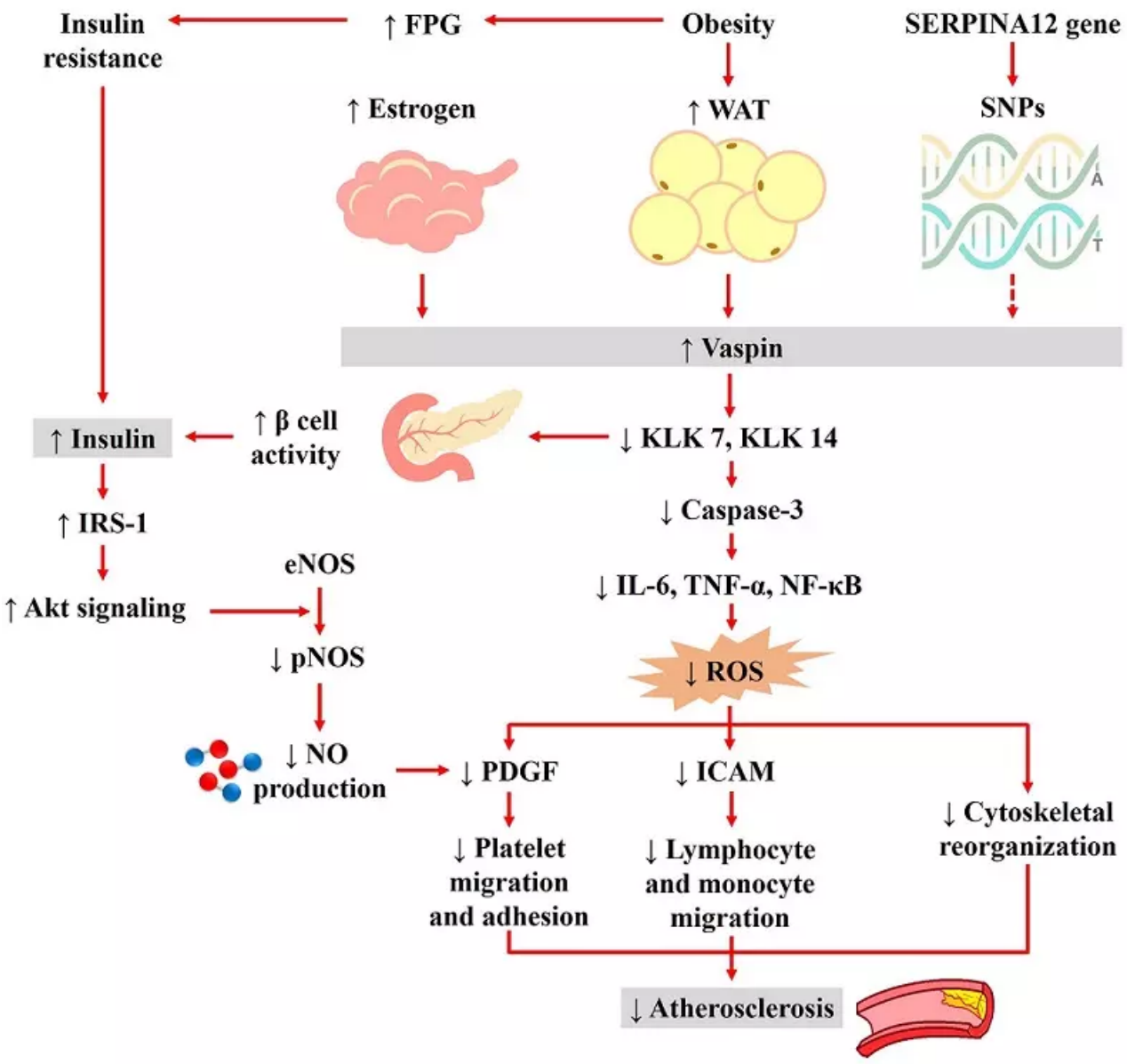

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The role of biopolymers as therapeutic agents: A review

I Gede Widhiantara, Anak Agung Ayu Putri Permatasari, I Wayan Rosiana, Ni Kadek Yunita Sari, I Made Gde Sudyadnyana Sandhika, Putu Angga Wiradana, I Made Jawi

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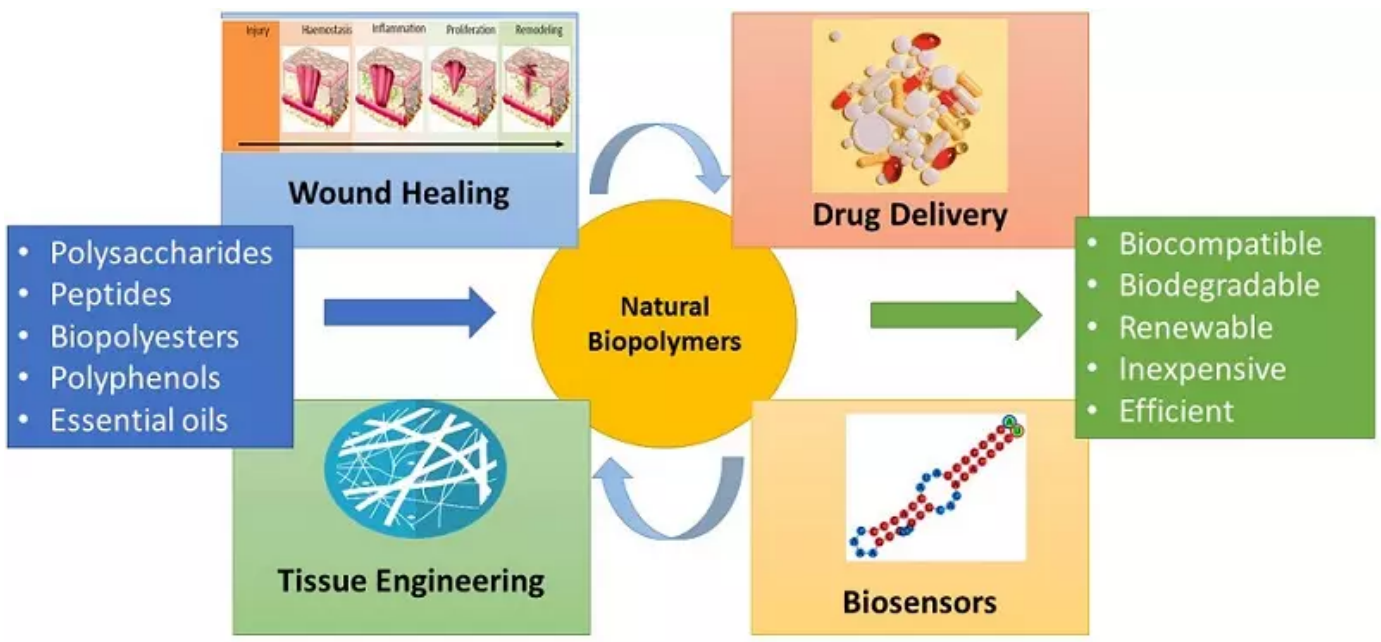

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Jyoshna Rani Dash, Gurudutta Pattnaik, Goutam Ghosh, Goutam Rath, Biswakanth Kar

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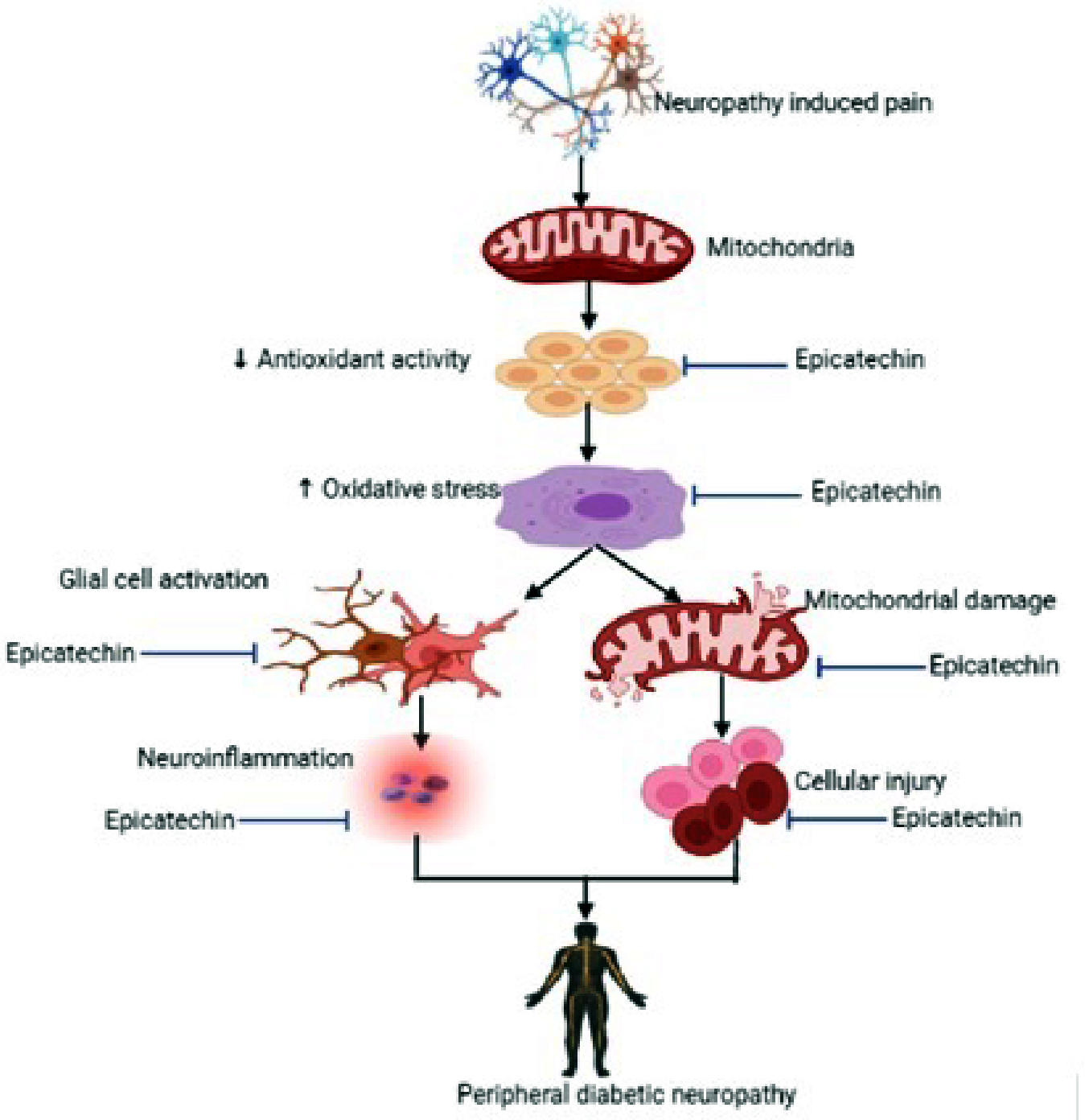

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Development of nanostructured lipid carriers loaded caffeic acid topical cream for prevention of inflammation in Wistar rat model

Prateeksha Prakash Kamath, Rutu Rajeevan, Swastika Maity, Yogendra Nayak, Reema Narayan, Chetan Hasmukh Mehta, Varalakshmi Velagacherla, Anjaneyulu Konuri, Usha Yogendra Nayak

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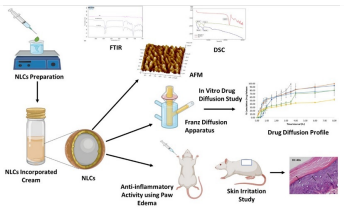

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Effect of exposure to aldehyde C9 (nonanal) on the electroencephalographic activity of humans according to time series analysis

Kandhasamy Sowndhararajan, Minju Kim, Songmun Kim

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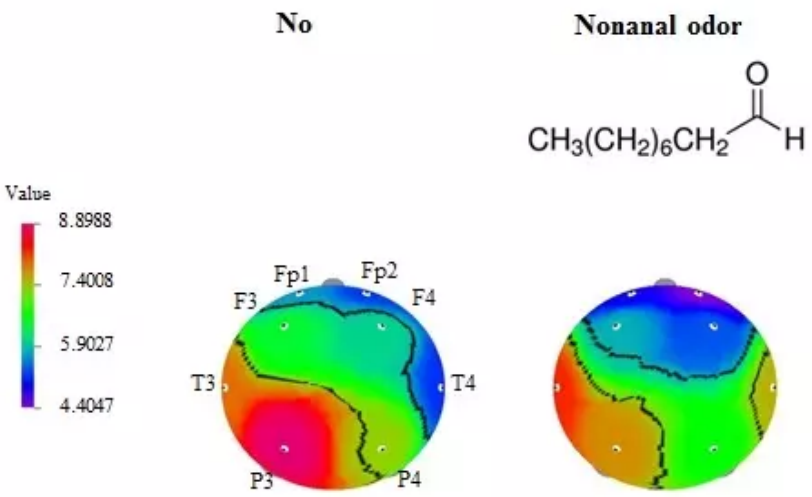
The electroencephalographic activity of nonanal (C9) odor is highly changeable during time series analysis. C9 odor produced significant changes in all absolute waves (except absolute gamma) at certain times during time series analysis.



Absolute mid beta wave significantly decreased at P3 region during the exposure of C9 odor

4 Jan, 2023 Research Article

Headspace solid-phase microextraction/GC/MS of volatile constituents of *Araucaria cunninghamii* and its antimicrobial potentials against multidrug-resistant pathogens

Seham Salah El-Din El Hawary, Mohamed Abdelatty Rabeh, Essam Mostafa Abd El-Kader, Mohamed Abdel Aziz El-Raey, Dalia Galal El-Din El-Kolobby

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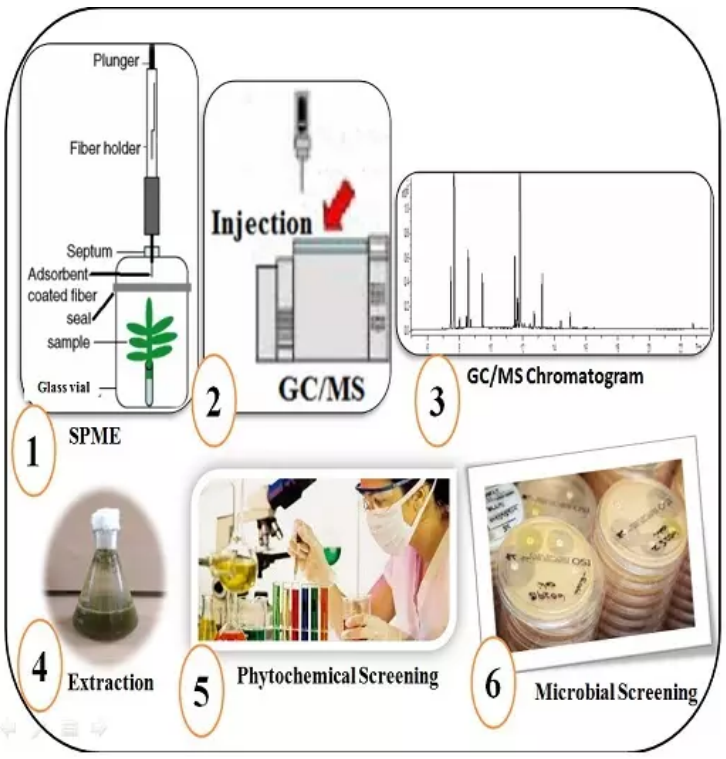

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Yasodha Subba, Samik Hazra, Chowdhury Habibur Rahaman

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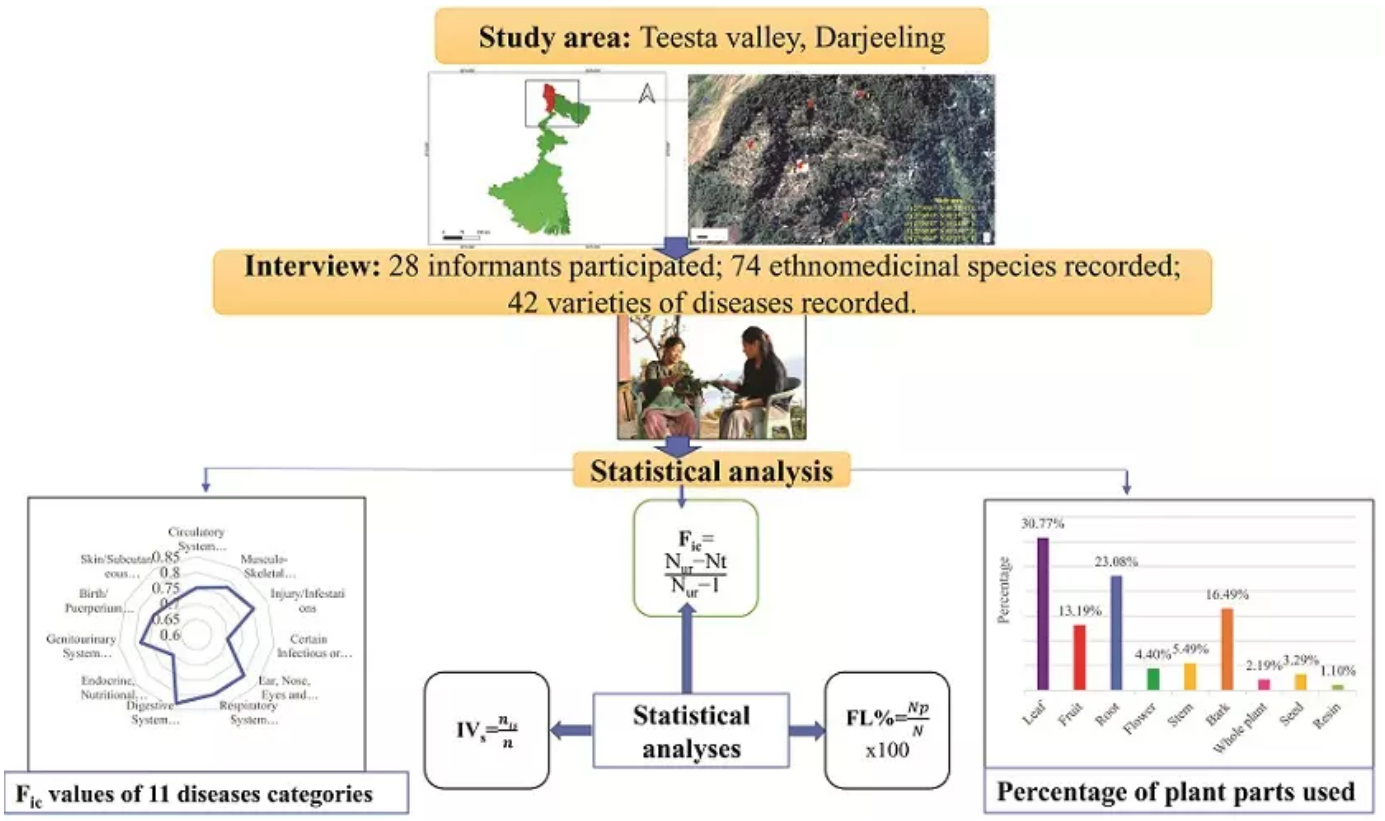

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Appropriateness of antibiotic prescription among hospitalized patients with urinary tract infection in Jordan

Anan Jarab, Treq Lewis Mukattash, Buthaina Nusairat, Maher Khdour

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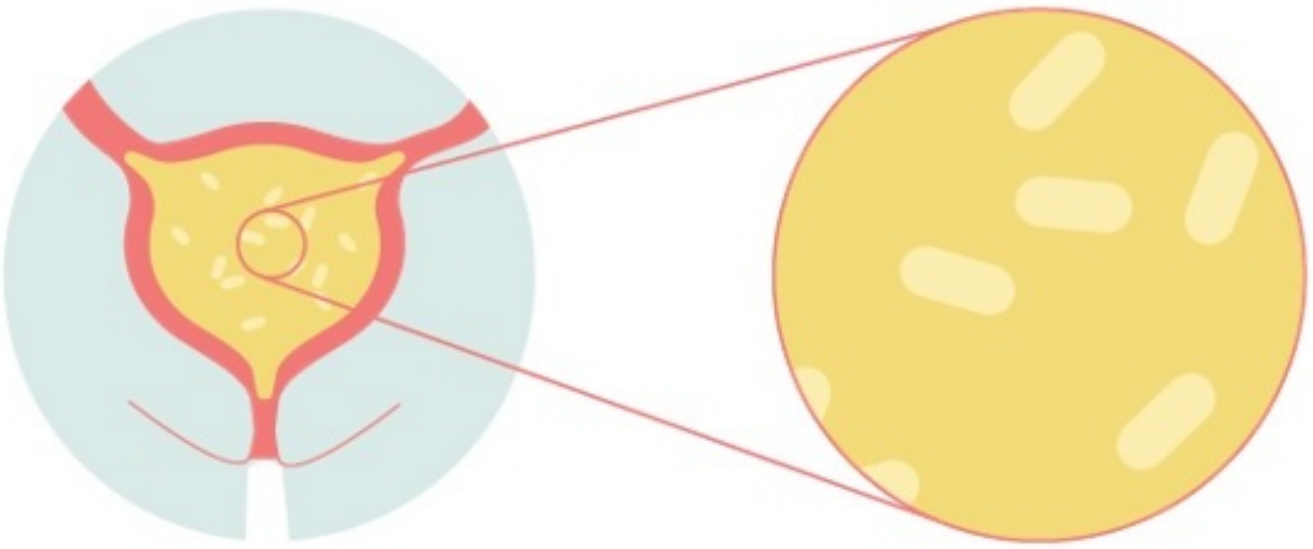

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Formulation and characterization of zaleplon buccal disks using grafted *Moringa oleifera* gum

Sonia Dhiman, Sonika Bhatt, Ashi Mannan, Sandeep Arora, Thakur Gurjeet Singh

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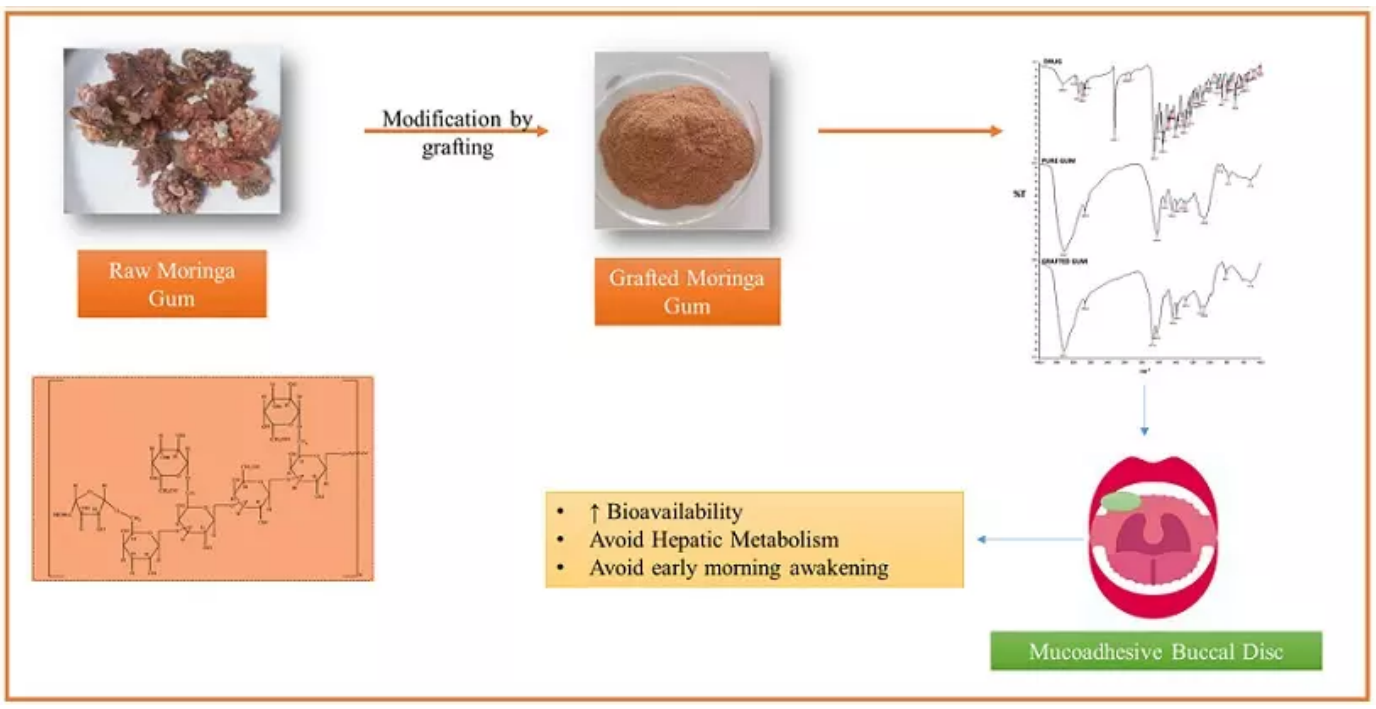

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Melanogenesis inhibition effect of ethanolic *Andrographis paniculata* leaf extract via suppression of tyrosinase and MITF expression

Rabe'ah Adam, Faiqah Ramli, Mariani Abdul Hamid, Siti Pauliena Mohd Bohari

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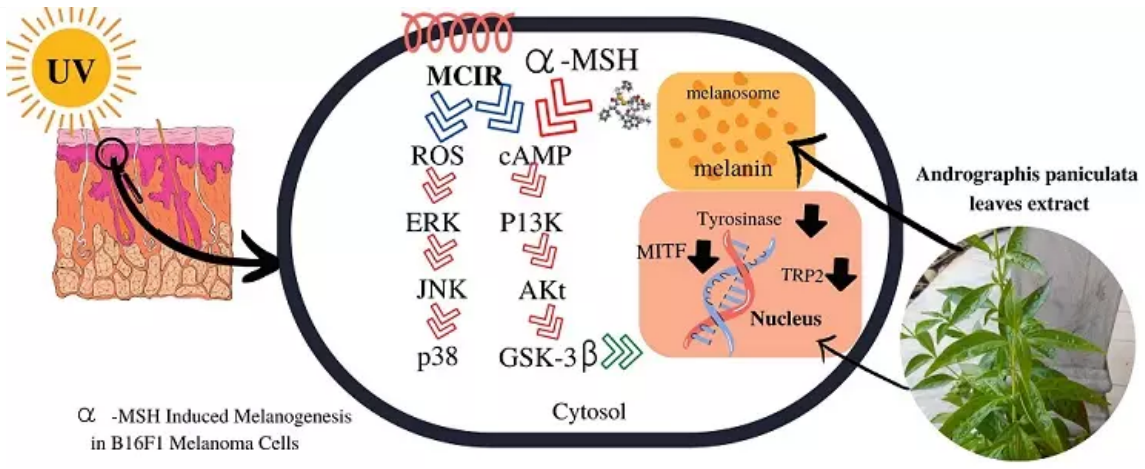

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FTIR-based fingerprinting combined with chemometrics method for rapid discrimination of *Jatropha* spp. (Euphorbiaceae) from different regions in South Sulawesi

Abdul Halim Umar, Reny Syahruni, Imanuel Ranteta'dung, Mohamad Rafi

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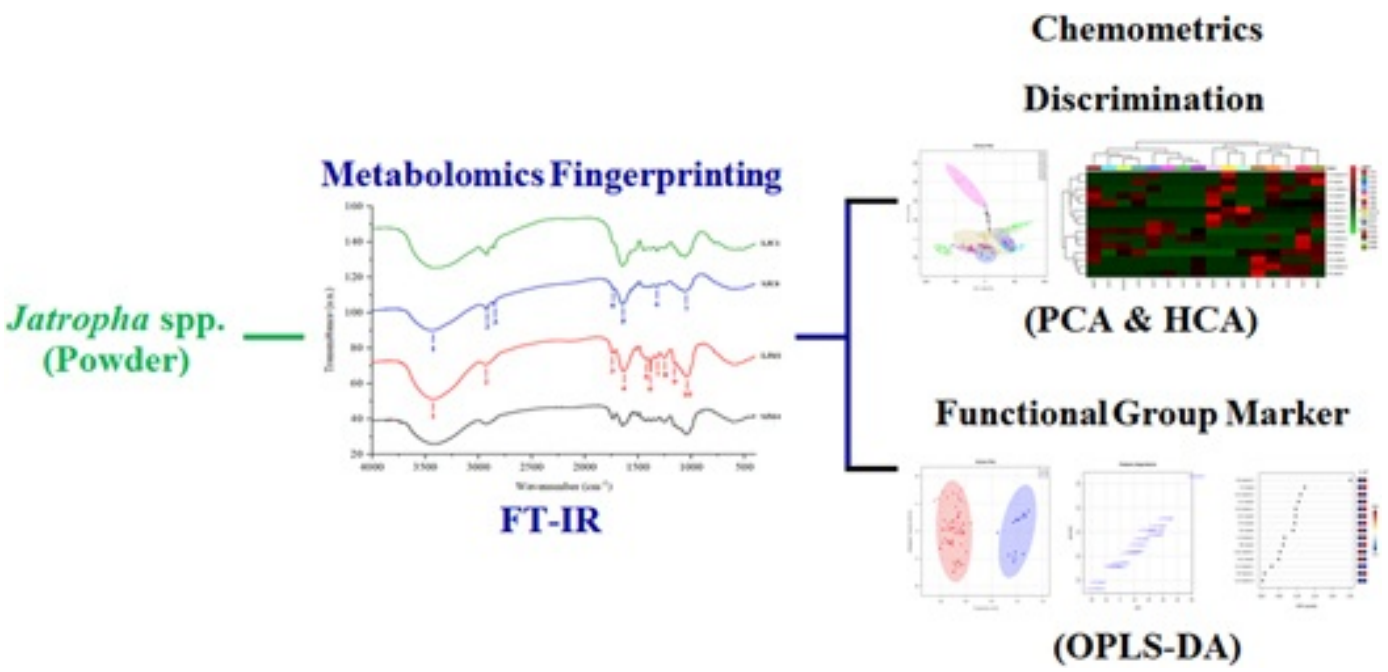

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Anan S. Jarab, Walid Al-Qerem, Tareq L. Mukattash

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The cytotoxicity studies of phytosterol discovered from *Rhizophora apiculata* against three human cancer cell lines

Rahmat Kurniawan, Syaikhul Azis, Sena Maulana, Arif Ashari, Budhi A. Prasetyo, Tati Suhartati, Sukrasno Sukrasno

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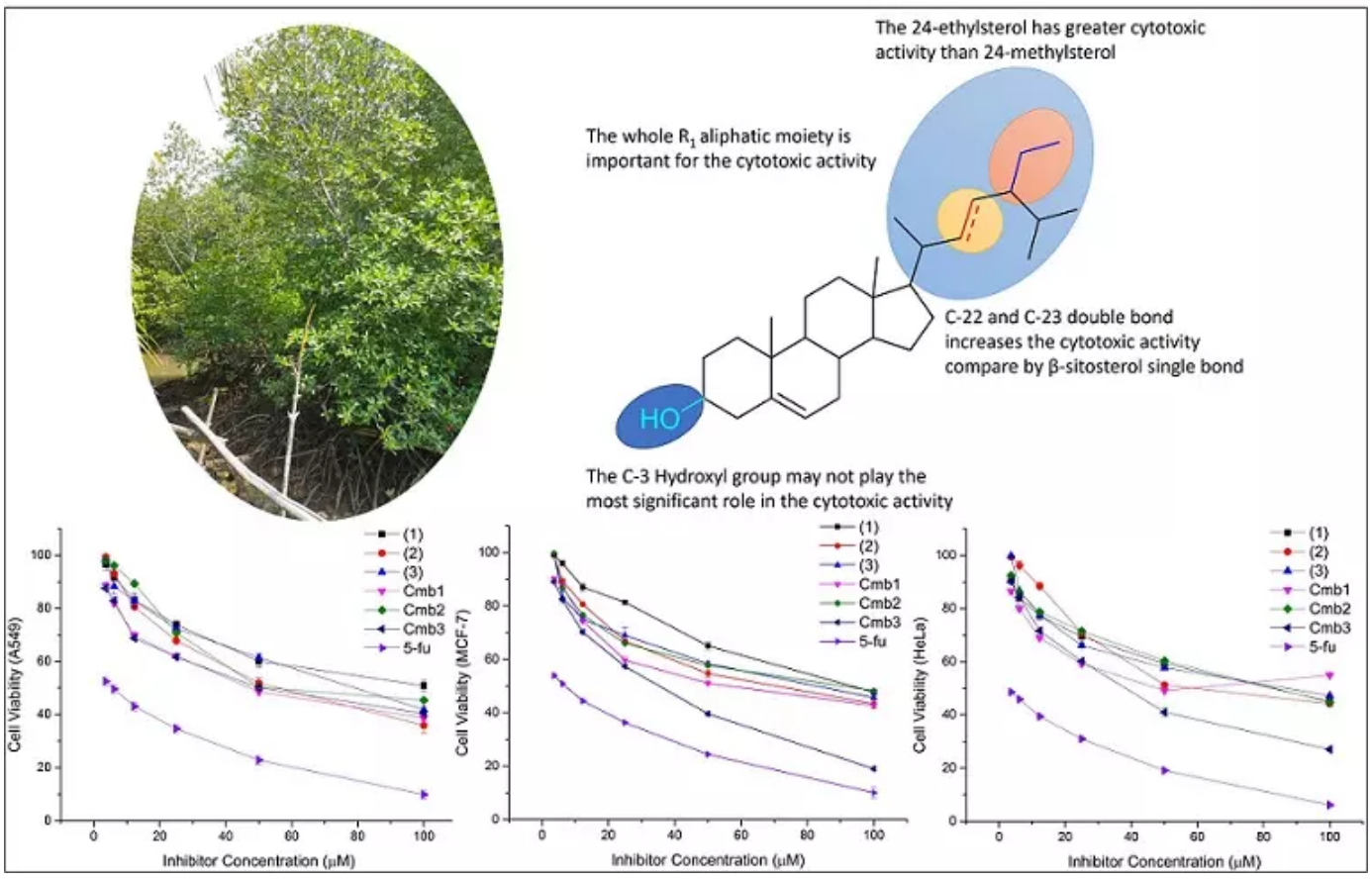

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New alternative herbal remedies for treatment of letrozole-induced polycystic ovary syndrome in rats

Naglaa Gamil Shehab, Hanan S. Anbar, Nadia Mahmoud Alrouby, Aya Abouelalamin, Lama Lutfi, Israa Tyseer Allo, Salma Mohamed Elayoty

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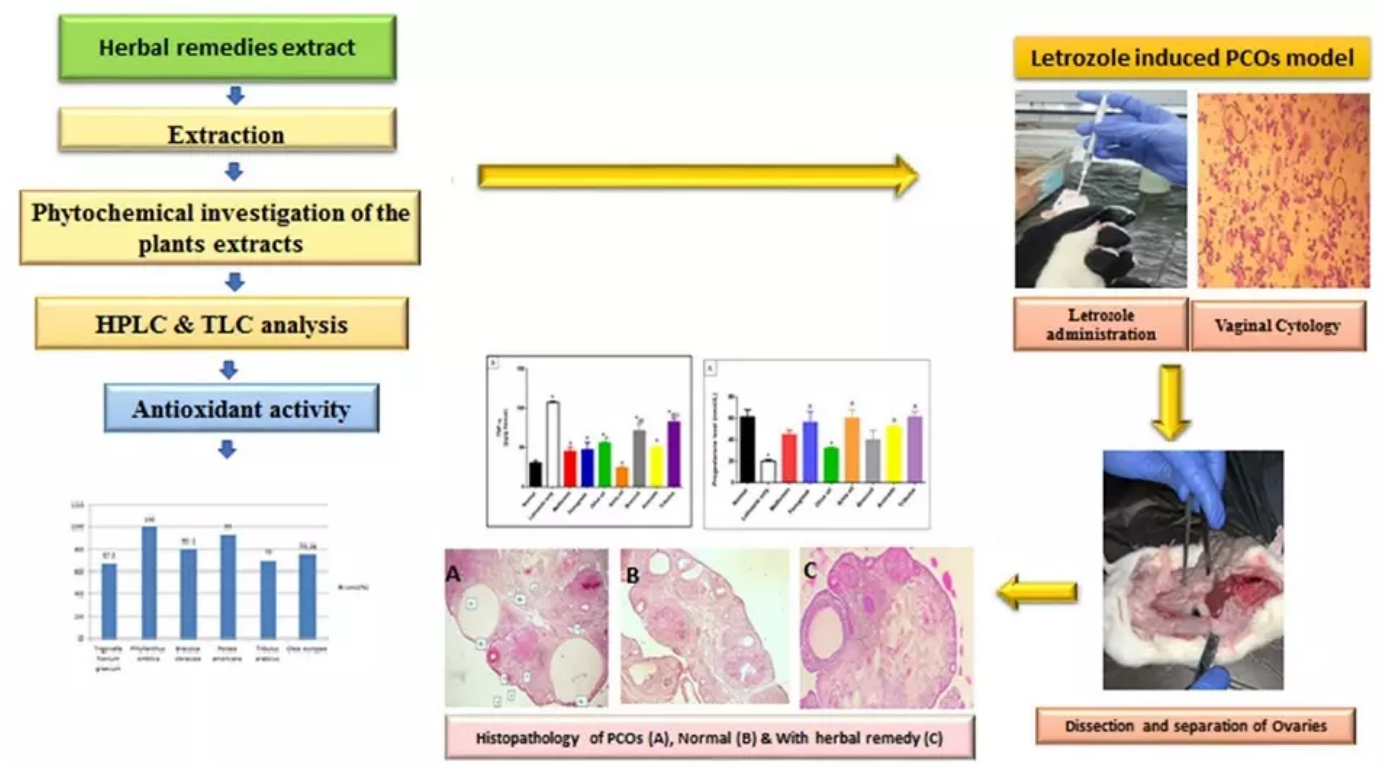

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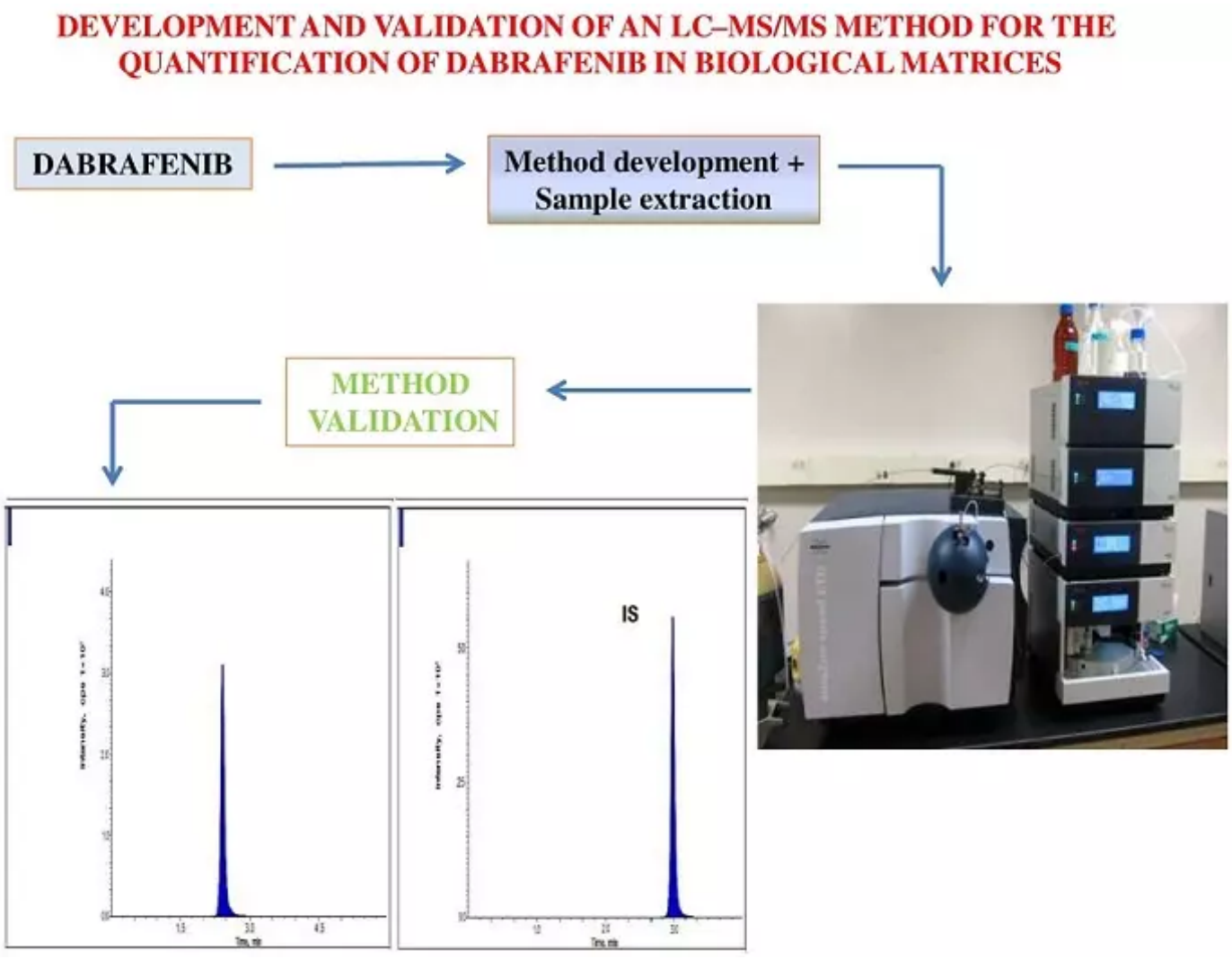

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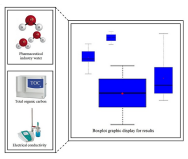

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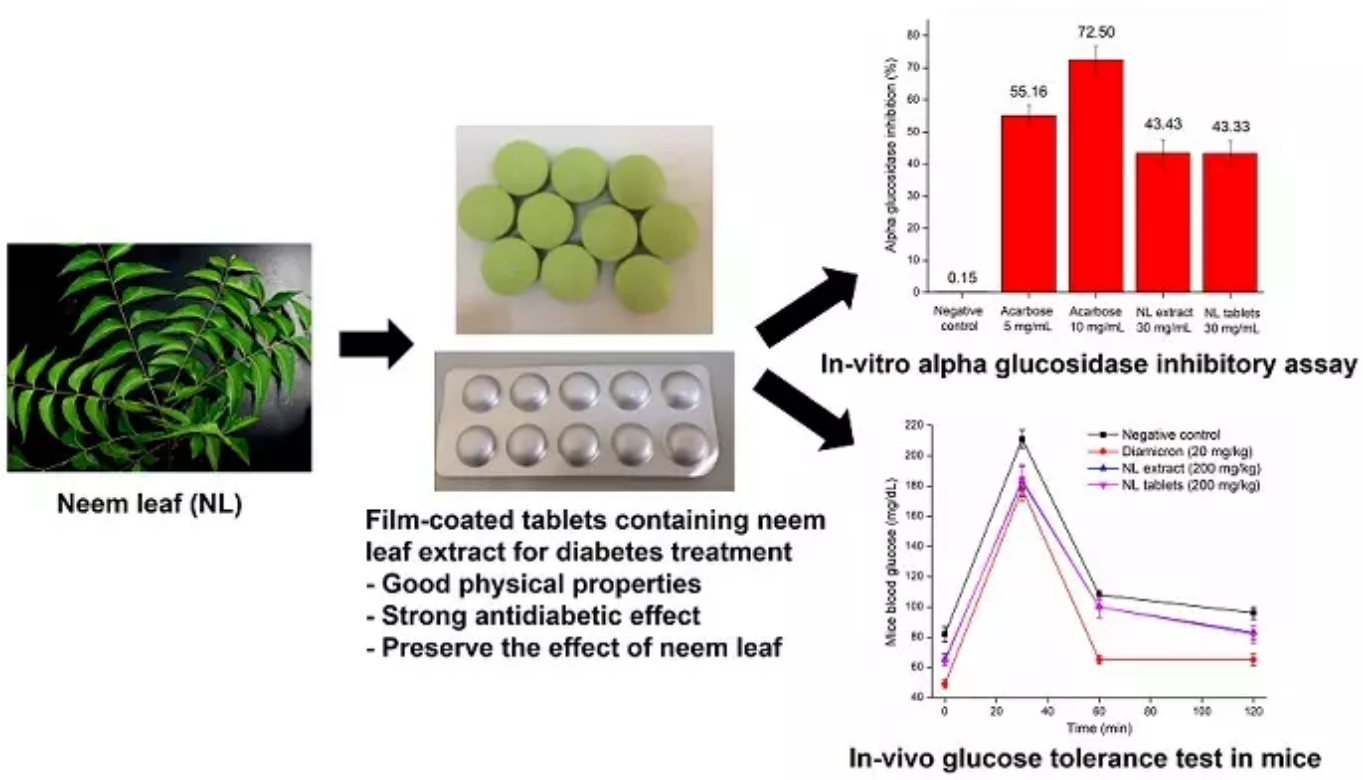

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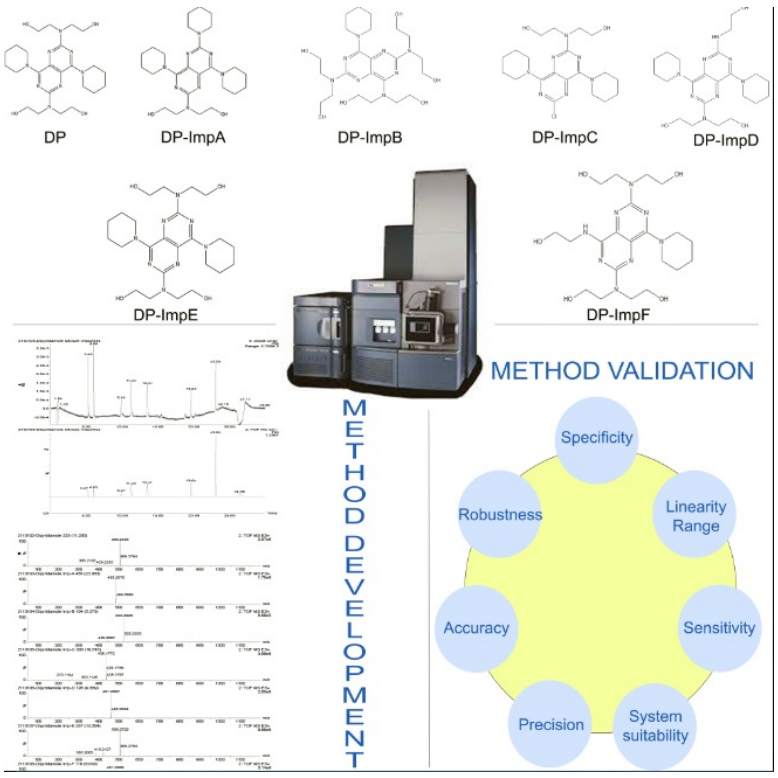

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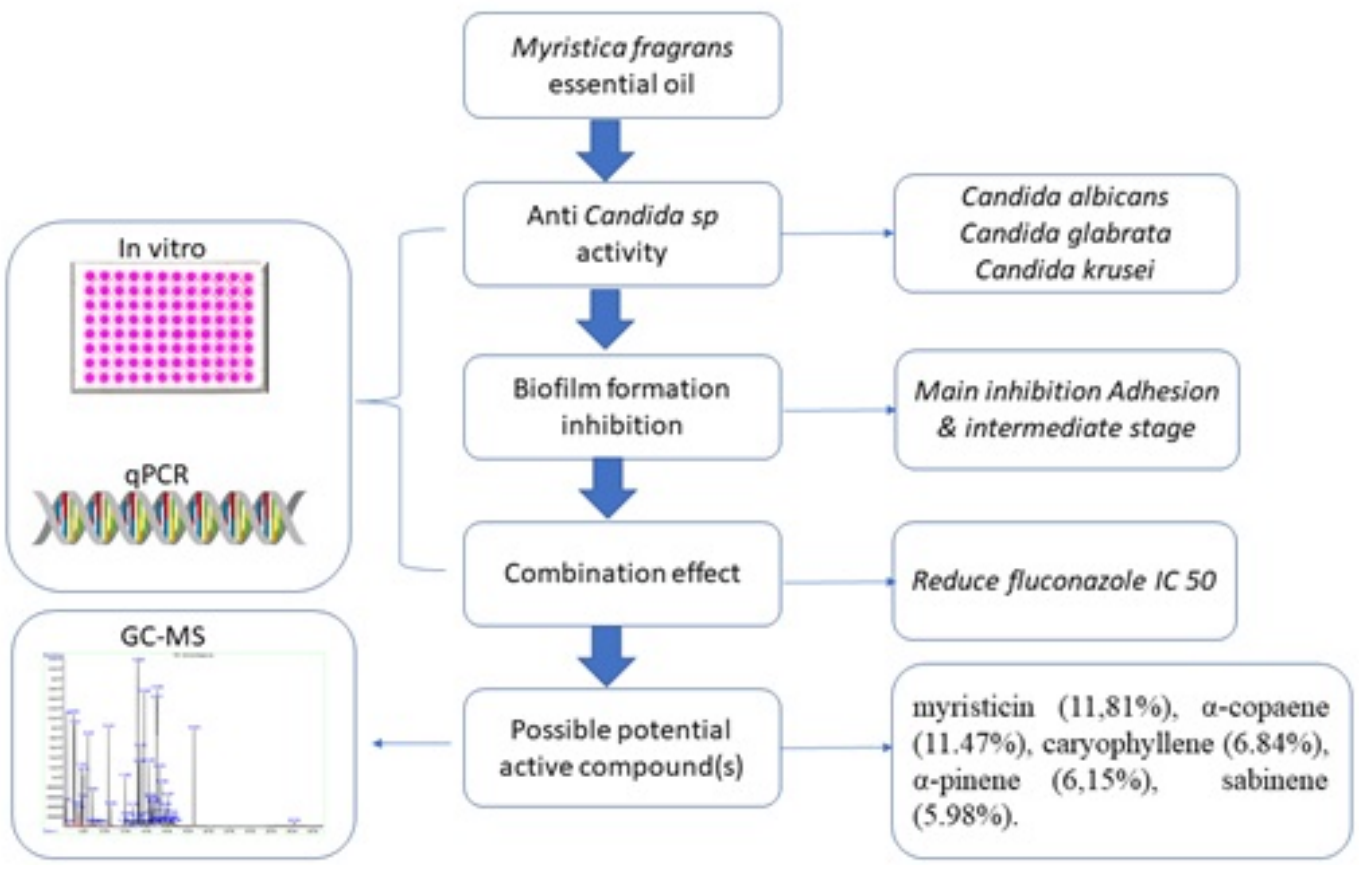

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Pharmacists' perceptions of pharmaceutical services in asthma inhaled medication in Surabaya: A mixed-method study

Amelia Lorensia, Ananta Yudiarso, Dini Dwi Kusdiyanti, Eka Damayanti

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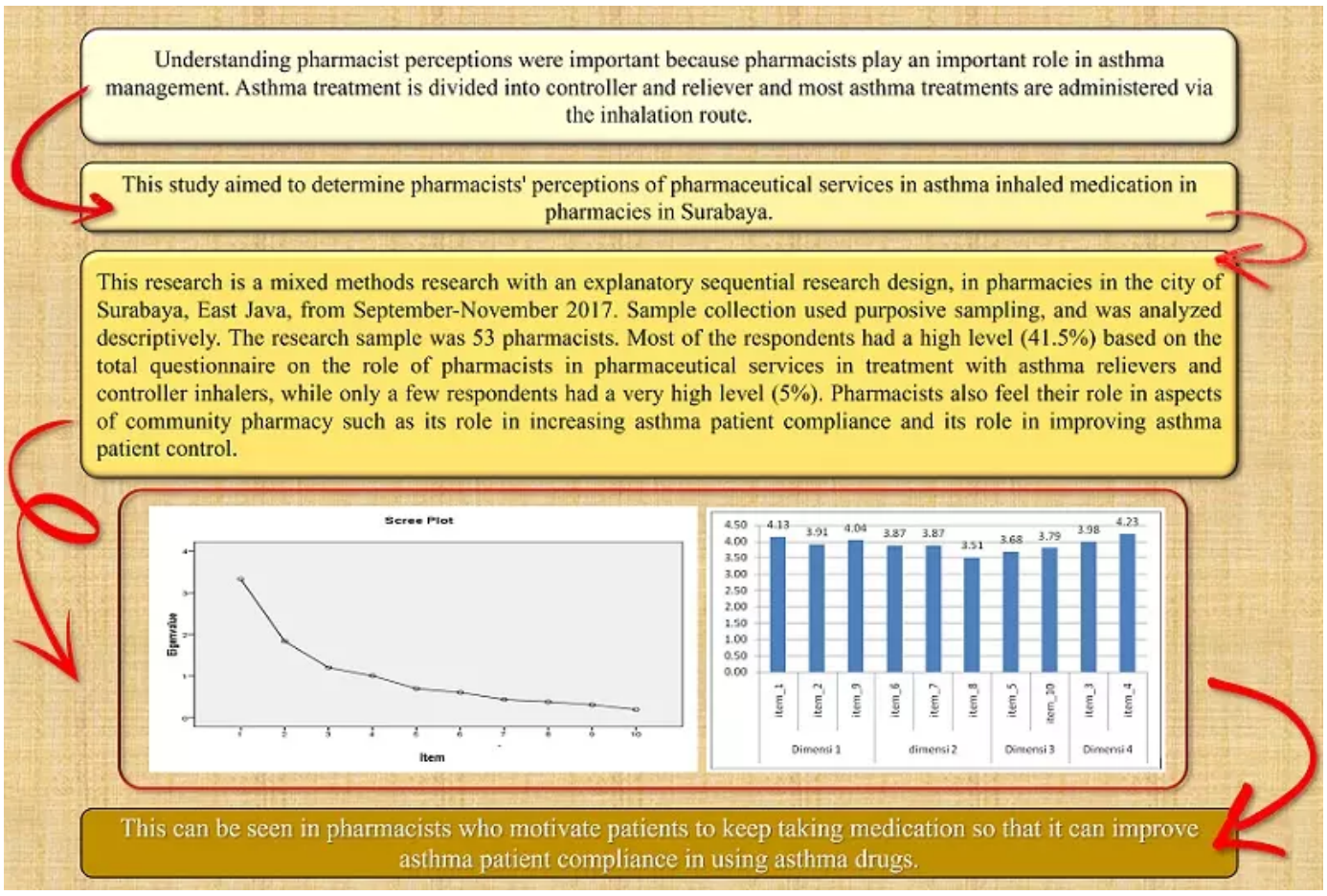

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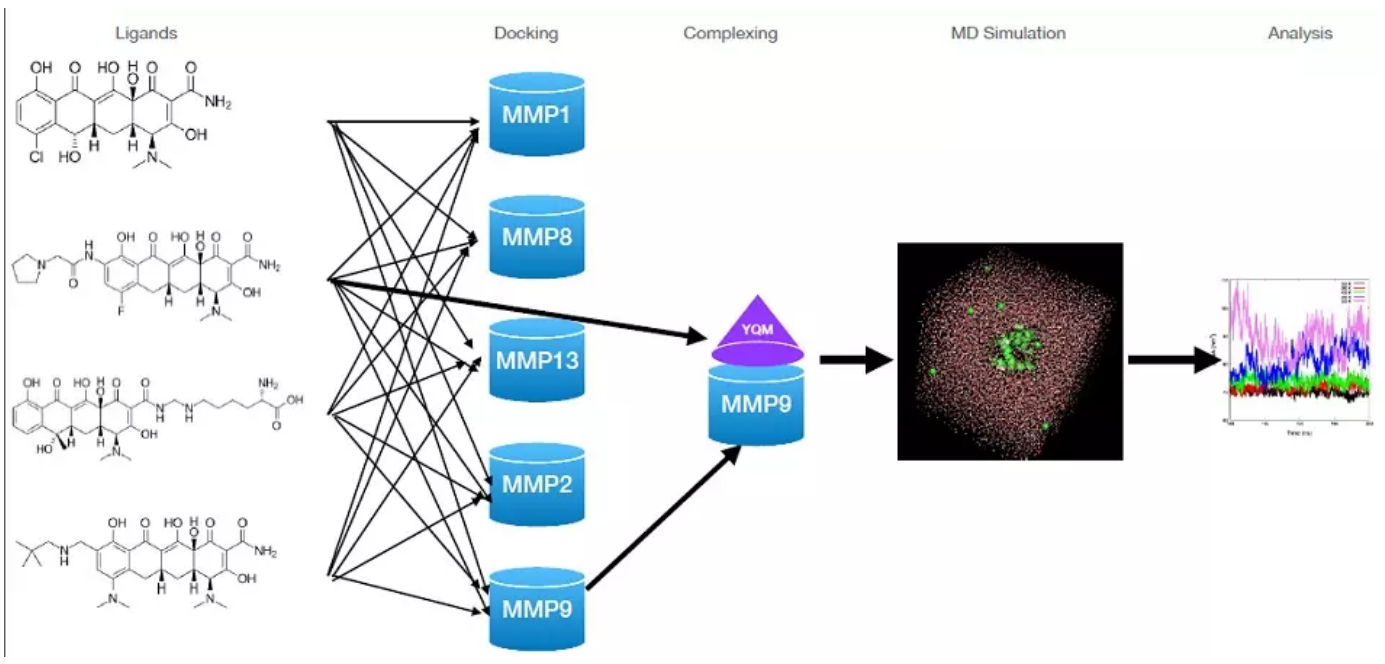

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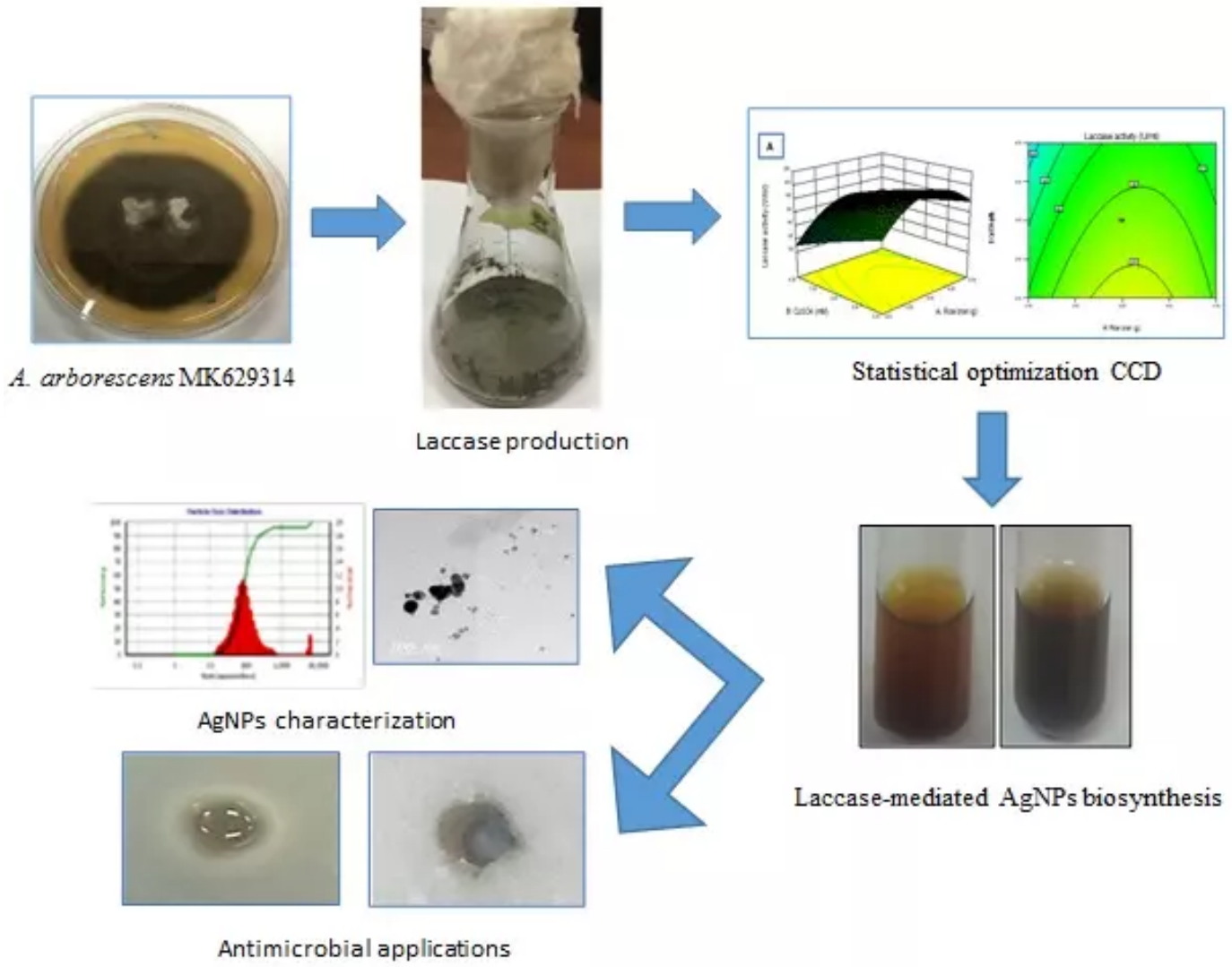

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Pharmacists' perceptions of pharmaceutical services in asthma inhaled medication in Surabaya: A mixed-method study

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Abstract

Understanding pharmacists' perceptions is important because pharmacists play an important role in asthma management. Asthma treatment is divided into controller and reliever, and most asthma treatments are administered via the inhalation route. This study aimed to determine pharmacists' perceptions of pharmaceutical services in asthma inhaled medication in pharmacies in Surabaya. This research is a mixed-method research with an explanatory sequential research design in pharmacies in the city of Surabaya, East Java, from September to November 2017. Sample collection used purposive sampling and was analyzed descriptively. The research sample was 53 pharmacists. Most of the respondents had a high level (41.5%) based on the total questionnaire on the role of pharmacists in pharmaceutical services in treatment with asthma relievers and controller inhalers, while only a few respondents had a very high level (5%). Pharmacists also feel their role in aspects of community pharmacy, such as their role in increasing asthma patient compliance and their role in improving asthma patient control. This can be seen in pharmacists who motivate patients to keep taking the medication so that this can improve asthma patient compliance in using asthma drugs.

Keyword: Asthma · inhaler · perception · pharmacist · pharmacy

Citation: Lorensia A, Yudiarso A, Kusdiyanti DD, Damayanti E. Pharmacists' perceptions of pharmaceutical services in asthma inhaled medication in Surabaya: A mixed-method study. J Appl Pharm Sci, 2023; 13(01):221–231. https://doi.org/10.7324/JAPS.2023.130108

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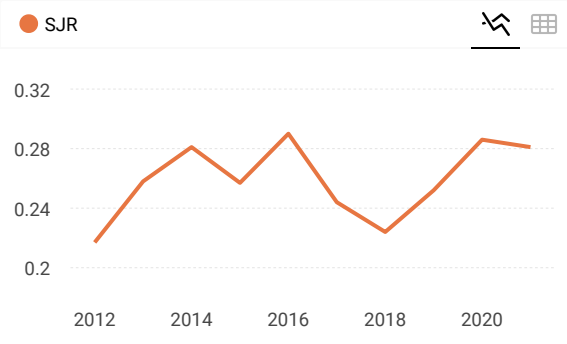

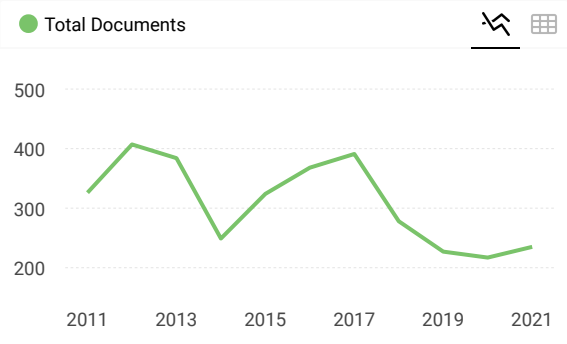

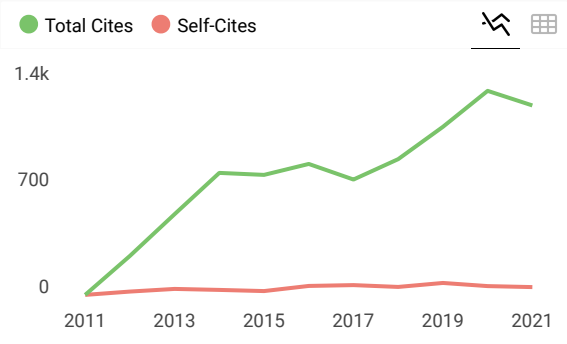

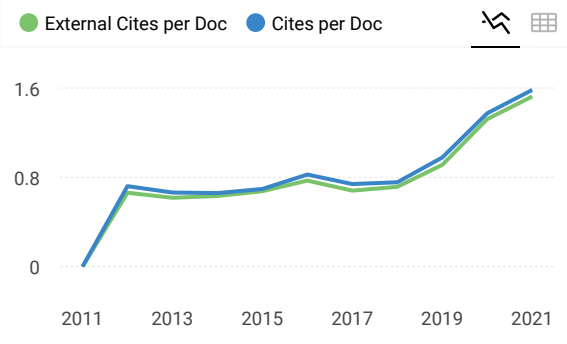

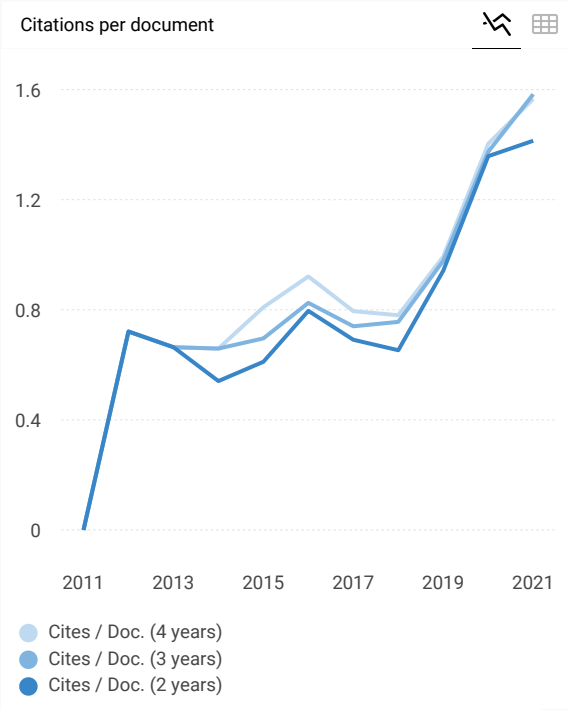

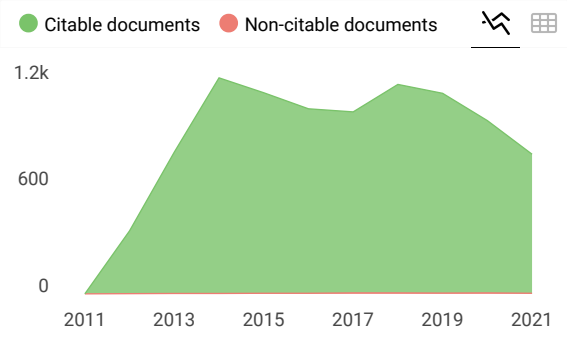

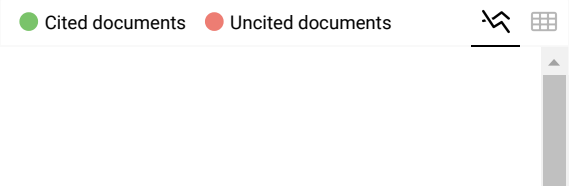

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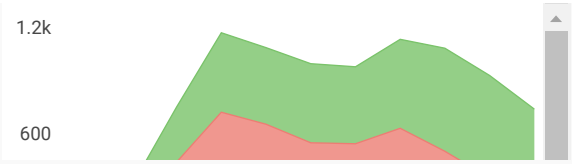

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Pharmacists' perceptions of pharmaceutical services in asthma inhaled medication in Surabaya: A mixed-method study

Amelia Lorensia[1]*, Ananta Yudiarso[2], Dini Dwi Kusdiyanti[1], Eka Damayanti[1]
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Asthma, inhaler, perception, pharmacist, pharmacy.

ABSTRACT
Understanding pharmacists' perceptions is important because pharmacists play an important role in asthma management. Asthma treatment is divided into controller and reliever, and most asthma treatments are administered via the inhalation route. This study aimed to determine pharmacists' perceptions of pharmaceutical services in asthma inhaled medication in pharmacies in Surabaya. This research is a mixed-method research with an explanatory sequential research design in pharmacies in the city of Surabaya, East Java, from September to November 2017. Sample collection used purposive sampling and was analyzed descriptively. The research sample was 53 pharmacists. Most of the respondents had a high level (41.5%) based on the total questionnaire on the role of pharmacists in pharmaceutical services in treatment with asthma relievers and controller inhalers, while only a few respondents had a very high level (5%). Pharmacists also feel their role in aspects of community pharmacy, such as their role in increasing asthma patient compliance and their role in improving asthma patient control. This can be seen in pharmacists who are very keen to keep taking the medication so that this can improve asthma patient compliance in using asthma drugs.

INTRODUCTION

Asthma is one of the most common chronic respiratory diseases and is a major public health issue globally, affecting people of all ages, genders, and ethnicities (Massoh *et al*., 2019; Tarraf *et al*., 2018; Quirt *et al*., 2018). Asthma needs serious attention; if it is not prevented and treated properly, it is estimated that there will be an even higher increase in the future and this can interfere with the growth process and quality of life of patients (Dharmage *et al*., 2019). Good asthma therapy treatment is very important in improving and maintaining the quality of life (Stoodley *et al*., 2019). Asthma can persist and interfere with daily activities, which causes loss in quality of life, decreased productivity, increased health costs, risk of hospitalization, and even death (Nunes *et al*., 2017; Stoodley *et al*., 2019).

A study in Asia and Europe found that asthma patients did not pay special attention to their disease and too quickly assumed that it had been controlled. This affects the compliance of asthma patients for control to health facilities and also adherence to taking medications that are in accordance with asthma treatment procedures (Chang *et al*., 2019; Global Initiative for Asthma, 2021). The number of asthma sufferers is increasing due to lack of knowledge and high drug costs (Dharmage *et al*., 2019; Enilari & Sinha, 2019; Nunes *et al*., 2017). This lack of knowledge will increase patient noncompliance in taking drugs and potentially become a barrier to patient recovery (Wong *et al*., 2020). Therefore, asthma knowledge is very important in achieving asthma control because patients can recognize and carry out self-management of asthma effectively so that they can achieve and maintain controlled asthma symptoms and prevent attacks at night and during the day and can perform various physical activities (Mammen *et al*., 2018; Nguyen *et al*., 2018).

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Pharmacists' perceptions of pharmaceutical services in asthma inhaled medication in Surabaya: A mixed-method study

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ABSTRACT

Understanding pharmacists' perceptions is important because pharmacists play an important role in asthma management. Asthma treatment is divided into controller and reliever, and most asthma treatments are administered via the inhalation route. This study aimed to determine pharmacists' perceptions of pharmaceutical services in asthma inhaled medication in pharmacies in Surabaya. This research is a mixed-method research with an explanatory sequential research design in pharmacies in the city of Surabaya, East Java, from September to November 2017. Sample collection used purposive sampling and was analyzed descriptively. The research sample was 53 pharmacists. Most of the respondents had a high level (41.5%) based on the total questionnaire on the role of pharmacists in pharmaceutical services in treatment with asthma relievers and controller inhalers, while only a few respondents had a very high level (5%). Pharmacists also feel their role in aspects of community pharmacy, such as their role in increasing asthma patient compliance and their role in improving asthma patient control. This can be seen in pharmacists who motivate patients to keep taking the medication so that this can improve asthma patient compliance in using asthma drugs.

INTRODUCTION

Asthma is one of the most common chronic respiratory diseases and is a major public health issue globally, affecting people of all ages, genders, and ethnicities (Massoth *et al*., 2019; Tarraf *et al*., 2018; Quirt *et al*., 2018). Asthma needs serious attention; if it is not prevented and treated properly, it is estimated that there will be an even higher increase in the future and this can interfere with the growth process and quality of life of patients (Dharmage *et al*., 2019). Good asthma therapy treatment is very important in improving and maintaining the quality of life (Stoodley *et al*., 2019). Asthma can persist and interfere with daily activities, which causes loss in quality of life, decreased productivity, increased health costs, risk of hospitalization, and even death (Nunes *et al*., 2017; Stoodley *et al*., 2019).

A study in Asia and Europe found that asthma patients did not pay special attention to their disease and too quickly assumed that it had been controlled. This affects the compliance of asthma patients for control to health facilities and also adherence to taking medications that are in accordance with asthma treatment procedures (Chang *et al*., 2019; Global Initiative for Asthma, 2021). The number of asthma sufferers is increasing due to lack of knowledge and high drug costs (Dharmage *et al*., 2019; Enilari & Sinha, 2019; Nunes *et al*., 2017). This lack of knowledge will increase patient noncompliance in taking drugs and potentially become a barrier to patient recovery (Wong *et al*., 2020). Therefore, asthma knowledge is very important in achieving asthma control because patients can recognize and carry out self-management of asthma effectively so that they can achieve and maintain controlled asthma symptoms and prevent attacks at night and during the day and can perform various physical activities (Mammen *et al*., 2018; Nguyen *et al*., 2018).

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Asthma treatment is divided into controller and reliever. Asthma medications that are used routinely to prevent asthma, reduce inflammation, control symptoms, and reduce future risks such as exacerbations and decreased lung function and are used daily to keep asthma under control are called controllers. In contrast to relievers, which are only used in an asthma attack, the importance of controlling it is to reduce symptoms and the patient's risk of having an asthma attack which causes a high risk of death (Global Initiative for Asthma, 2021). Excessive use of relievers or using them at increased doses can result in asthma getting worse and worse (Global Initiative for Asthma, 2021; Kaplan *et al.*, 2020; Quirt *et al.*, 2018).

Most asthma treatments are administered via the inhalation route because the inhalation route provides faster onset of action and has better efficacy (Borghardt *et al.*, 2018). Errors in the use of inhalers were one contributor to poor control of asthma patients (Usmani *et al.*, 2018). If the patient is comfortable using an inhaler correctly, then effective asthma control can be achieved because an improper inhaler technique reduces drug delivery to the airways, thereby reducing the effectiveness of the inhaler medication, which can result in poor asthma control (Jahedi *et al.*, 2017). Research on inhalers in patients showed that the absence of prior instructions regarding inhaler use could lead to inadequate use technique (Jahedi *et al.*, 2017).

Pharmacists play a role in providing drugs and recommendations in selecting the right drug based on the patient's condition obtained from the results of counseling with pharmacists and the results of diagnoses from doctors (Lorensia *et al.*, 2017, 2020, 2021). Understanding pharmacists' perceptions was important because pharmacists play an important role in asthma management, such as disease management, medication management, and patient monitoring, as well as saving health costs (Lorensia *et al.*, 2021). The importance of this perception is due to the patient's lack of knowledge about the management of asthma and poor asthma control behavior which becomes a barrier to the success of asthma treatment (Lorensia *et al.*, 2020; Majellano *et al.*, 2019). Pharmacists assume that their role has been carried out well, although not all patients receive the same asthma treatment education. This can be seen in pharmacists who only provide education to patients who have recently used the drug and assume that patients who have been on treatment for a long time must be right in using their drugs (Jalmav *et al.*, 2021).

This research was a mixed-method research with quantitative and qualitative approaches, with a phenomenological approach. Previous research in Surabaya city showed that most patients who were prescribed inhaled drugs do not use their inhalers properly. In one clinical study, 90% of the patients demonstrated an incorrect technique in the use of metered-dose inhalers (MDIs) (Lorensia *et al.*, 2018) and dry powder inhalers (DPIs) (Lorensia *et al.*, 2016, 2019). There were considerable differences in the lung deposition achieved with certain types of devices. Usually, the number of particles reaching the target location ranges from 8% to 60% with MDIs and about 10 to more than 40% with DPIs (Lorensia *et al.*, 2019). The role of pharmacists was very influential for asthma patients, so this study aimed to determine how pharmacists perceive pharmaceutical services in treating asthma reliever inhalers at pharmacies in Surabaya, which was intended so that pharmacists can play their maximum role in treating patients in pharmaceutical services.

METHOD

Research design

This research was a mixed-method research with quantitative and qualitative approaches complementing the description of the study results regarding the phenomenon under study to strengthen the research analysis. This research design used a sequential explanatory model or combined quantitative and qualitative research methods sequentially. The location was chosen in pharmacies that practice pharmacy in Surabaya city, East Java, from September to November 2017. This study was approved with Ethical Test No. 024/KE/V/2017 at the Universitas Surabaya.

Quantitative phase

The quantitative study used a survey research method that aimed to determine the role of pharmacists in pharmaceutical services in the treatment of asthma with inhalers at pharmacies in Surabaya. The data collection method in this study was using a questionnaire in the form of a scale obtained from previous research (Kritikos *et al.*, 2010).

Qualitative phase

The qualitative research was conducted using the interpretative phenomenological analysis research method, which aimed to determine the pharmacists' perceptions of pharmaceutical services in treatment with asthma inhalers at pharmacies in Surabaya. The interview method used in this research was the in-depth interview method. The data analysis technique in this research was thematic analysis, such as factor analysis.

Population and sample

In this study, the research target population were the pharmacists who work in pharmacies in Surabaya City. The research sample were pharmacists who worked in pharmacies in Surabaya city, who met the sample criteria, and were willing to participate in the research. The criteria were pharmacists who represent one pharmacy who were willing to fill out the informed consent and stand by at the pharmacy for at least 8 h/day for five working days and who work in pharmacies that sell inhaler preparations.

In this study, sampling was carried out using the purposive sampling technique. Determination of the sample size was determined based on a feasibility study that was carried out by researchers to determine the total affordable population. Based on data from the Surabaya City Health Office in 2013 data on pharmacies in the Surabaya city area, there are 869 pharmacies. From a total of 869 existing pharmacies, it was known that the number of members of the affordable population was 114 pharmacists representing 1 pharmacy. Based on the number of pharmacies, with a margin of error (5%) and confidence level (95%), the calculation of the minimum sample size used the formula $n = [p.q.N.Z^2]/[d^2.N + p.q.Z^2]$, where n = number of samples; $p = q = 0.5$; N = population (114), d = degree of accuracy (0.1), and z = standard deviation of normal according to the 95% significance level was 1.96. From the results of the calculation of

the sample size above, the minimum sample for this study was 52 pharmacists, where each pharmacist represented the pharmacy where they work and one pharmacy can only be represented by one pharmacist. Of the 869 pharmacies that had been previously investigated by the researcher, there were 609 pharmacies with pharmacists who were not on standby at the pharmacy, 64 pharmacies were not operating, 19 pharmacies did not serve the public, and 63 pharmacies refused.

Data collection and analysis method

Distribution of informed consent and interview using the in-depth interview method used structured and semi structured interview guides.

Validation of the questionnaire was carried out by equating the meaning and assessment of each statement on the questionnaire. The questionnaire was translated into the Indonesian language. Language validation was carried out by submitting the translation results to three expert judges from community pharmacists. The suitability score was then validated using the content validity ratio (CVR) and was declared valid if CVR was >0.29. Interviews were made with the framework of thinking as in Table 1 (Nos. 1–3 (Global Initiative for Asthma, 2021; Jahedi *et al*., 2017; Kaplan *et al*., 2020; Tavakoli *et al*., 2018); Nos. 4–6 (Banjari *et al*., 2018; Clark *et al*., 2019; Fernandes *et al*., 2018; Kuti *et al*., 2017; Nguyen *et al*., 2018); Nos. 7–8 (Atif *et al*., 2020; Bobbins *et al*., 2020); Nos. 9–10 (Carvajal and Popovici, 2018; Chogtu *et al*., 2017; Dalton and Byrne, 2017). The construct validity (CV) test used factor analysis with the exploratory factor analysis (EFA) system to find factor loads in the relationship between the dimensions (factors) and items. The reliability test was conducted to determine the instrument, if Cronbach's alpha value >0.7, then it was reliable.

The overall interpretation of the analysis was the analysis of the interpretation of the quantitative and qualitative results, namely by combining the results from the quantitative phase and the qualitative phase of the research into the overall results of the study so that a unified conclusion was obtained.

RESULTS

Research implementation

A total of 114 pharmacists were an affordable population who met the inclusion criteria of the study sample. A total of 53 pharmacists were sampled and were willing to take part in the study. Of the 53 respondents, all of them filled out the questionnaire as part of the quantitative phase of the study, but only 12 respondents were willing to continue the in-depth interviews, which were part of the qualitative phase of the study.

Characteristics of respondents

Among the 53 pharmacists, 90.57% were female and 9.43% were male. The age range of most participants was 26–35 years. An apothecary management apothecary [*Apoteker Pengelola Apotek* (APA)] is a pharmacist who can operate a pharmacy in one place, while a companion pharmacist [*Apoteker Pendamping* (APING)] is a pharmacist who replaces the APA at certain hours during the operating hours of a pharmacy. Most of the respondents were APA (92.45%) (Table 2).

Pharmacists practice pharmacy that provides various types of inhaler preparations, namely the MDI. This was because MDI preparations were more familiar and their price was more affordable. The most common type of reliever was salbutamol MDI (66.04%), while the most common type of controller was a combination of salmeterol and fluticasone MDI (66.04%) (Table 3).

Table 1. Interview guidelines for pharmacists' perceptions of their role in pharmaceutical services in treatment with asthma inhalers.

No.	Questionnaire	Question	Question purpose
1	Frequency of using inhaler	1. Use of reliever and controller 2. Impact of using reliever and controller	To determine the use of relievers and the impact of excessive use of reliever inhalers (Global Initiative for Asthma, 2021; Jahedi *et al*., 2017; Kaplan *et al*., 2020; Tavakoli *et al*., 2018).
2	reliever (asthma reliever medication) and controller (asthma control medication)		
3	Frequent/overuse of relievers (asthma relievers) and controllers (asthma control medications)		
4	Patient self-monitoring of asthma control (based on symptoms or peak flow measurement)	3. Patient understanding of asthma prevention 4. The relationship between asthma control level and asthma knowledge	To determine the factors associated with asthma (Clark *et al*., 2019; Fernandes *et al*., 2018; Kuti *et al*., 2017), and to determine the relationship between the level of asthma control and knowledge about asthma (Banjari *et al*., 2018; Nguyen *et al*., 2018).
5	Asthma trigger factors and prevention strategies		
6	Current level of control of asthma patients		
7	Have an action plan	5. The role of pharmacists in the treatment of asthma patients 6. Pharmaceutical services for asthma patients	To find out the pharmaceutical services performed by pharmacists in pharmacies (Atif *et al*., 2020; Bobbins *et al*., 2020).
8	Techniques for using inhaler preparations that have been used regularly		
9	Patient self-management of asthma (ie: recognizing when and knowing how to take action when asthma worsens)	7. Low adherence of asthma patients 8. Causes and effects of improper use of inhalers	This study aims to determine the impact of low asthma medication adherence (Pearce and Fleming, 2018), and to determine the causes and effects of improper use of inhalers (Chogtu *et al*., 2017).
10	Lack of adherence to relievers (asthma relievers) and controllers (asthma controller medications)		
	Techniques for using an inhaler when an inhaler is first prescribed		

Instrument validity test

The validity test was the level of reliability and validity of the instrument or measuring instrument used. The CVR was the accuracy of a measuring instrument in terms of the content of the measuring instrument through rational analysis by expert judgment. The results of the data validity test showed that items 1–10 were valid [CVR value = 0.75(>0.29)], so the questionnaire could be used as a measuring tool (Table 4).

CV was used using factor analysis with the EFA system to look for the loading factor which is the relationship between dimensions (factors) and items. The condition of the loading factor was >0.5. The results of factor analysis showed the following values:

a. The sample sufficiency test was conducted using Kaiser–Meyer–Olkin (KMO) and a measure of sampling adequacy (MSA), provided that the KMO value was >0.5. The results showed KMO and MSA values for the correlation between variables in the KMO, and Bartlett's test box showed a value of 0.661 which was >0.5. Meanwhile, the significant result from Bartlett's test of sphericity was 0.000. Based on the results above, it can be concluded that this instrument met the valid requirements, so the data was eligible for further factor analysis.
b. The item independence test was used to test each item in the questionnaire, provided that the anti-image correlation value was >0.4. The results of the analysis test showed that the correlation value of each item was as follows: item 1 = 0.685, item 2 = 0.553, item 3 = 0.598, item 4 = 0.581, item 5 = 0.715, item 6 = 0.634, item 7 = 0.641, item 8 = 0,800, item 9 = 0.767, and item 10 = 0.654. The results showed that the correlation between the independent variables of each item was classified as high, namely all items had an anti-image correlation data value >0.4 so that, based on the results of item validity testing, it can be concluded that all items were valid and all independent variables could be analyzed further.
c. The exploratory factor analysis was carried out to find the loading factor, which is the relationship between dimensions (factors) and items. The provisions were that the loading factor was >0.5. The following was the loading factor from items 1 to 10. Two items did not meet the loading factor (loading factor <0.5), namely items 4 and 10; the two items would still be analyzed with consideration of CVR and reliability. The following results of the exploratory factor analysis can be seen in Figure 1.

Figure 1 shows the dimensions (factors) with eigenvalues >1, which means there were four dimensions (factors) formed. The results of the exploratory factor analysis in the graph showed that four factors made up the pharmacist's perception of their role in pharmaceutical services in treatment with asthma reliever inhalers. There were no double-loaded loading factors or values indicating that there were items that have the same dimensions; this indicates that there were four dimensions or four factors of pharmacist perception of their role in pharmaceutical services in treatment with asthma reliever inhalers. There were four dimensions or factors and the members contained in them.

The DI was the distinguishing power of the item, namely the ability of the item to distinguish a sample that had high and low score groups. There are many ways to calculate the discrimination index. The technique used in this study was to use the product–moment Pearson correlation between items and the total. Good items were items that had item correlation – a total of >0.3. The results of the discrimination index test showed that, from a total of 53 samples, all items had good discrimination with an average significance of 0.000 and the total item correlation value was >0.3.

Instrument reliability test

The reliability test was conducted to determine whether the instrument, in this case, the questionnaire, could be used more than once to produce data that was consistent with the condition that Cronbach's alpha was >0.7. From the item reliability test with Cronbach's alpha, the results of the reliability test showed a value

Table 2. Frequency distribution based on characteristics of respondents.

Characteristics of respondents		Frequency (*n*: 53)	Percentage (%)
Gender	Male	5	9.43
	Female	48	90.57
Age (years)	17–25	2	3.77
	26–35	41	77.36
	36–45	9	16.98
	46–55	1	1.89
Position	APA	49	92.45
	APING	4	7.55

Table 3. Frequency distribution based on inhaler preparations available in pharmacies.

Type of inhaler	Active ingredients	Pharmacy frequency (*n*: 53)	Percentage (%)
Reliever	Salbutamol MDI	35	66.04
	Ipratropium bromide MDI	4	7.55
	Metaproterenol sulfate MDI + salbutamol MDI	9	16.98
	Salbutamol MDI + ipratropium bromide MDI + fenoterol MDI	5	9.43
Controller	Salmeterol + fluticasone propionate MDI	35	66.04
	Beclomethasone dipropionate MDI	10	18.87
	Fluticasone propionate MDI	8	15.09

Information: classification of pharmacies where pharmacists run pharmaceutical services that provide inhalers based on research SOPs.

Table 4. Results of the content validity ratio (content validity ratio) questionnaire.

Item	Question	CVR					CV			Discrimination index (DI)		
		Ne	*N*/2	*N*−1	CVR	Description	Loading factor	Description	Dimension (factor)	Dimension	Pearson correlation	Sig (*N* = 53)	Description
1	Frequency of using an inhaler reliever (asthma reliever medication) and controller (asthma control medication)	3	1.5	2	0.75	Valid	0.672	Valid	1	Asthma monitoring	0.572	0.000	Good discrimination
2	Frequent/overuse of relievers (asthma relievers) and controllers (asthma control medications)	3	1.5	2	0.75	Valid	0.544	Valid			0.426	0.001	Good discrimination
3	Patient self-monitoring of asthma control (based on symptoms or peak flow measurement)	3	1.5	2	0.75	Valid	0.420	Valid			0.470	0.000	Good discrimination
4	Asthma trigger factors and prevention strategies	3	1.5	2	0.75	Valid	0.500	Valid	2	Asthma control	0.566	0.000	Good discrimination
5	The current level of control of asthma patients	3	1.5	2	0.75	Valid	0.565	Valid			0.677	0.000	Good discrimination
6	Have an action plan	3	1.5	2	0.75	Valid	0.631	Valid			0.677	0.000	Good discrimination
7	Techniques for using inhaler preparations that have been used regularly	2	1.5	2	0.75	Valid	0.690	Valid	3	Asthma management	0.597	0.000	Good discrimination
8	Patient self-management of asthma (ie: recognizing when and knowing how to take action when asthma worsens)	2	1.5	2	0.75	Valid	0.726	Valid	3		0.657	0.000	Good discrimination
9	Lack of adherence to relievers (asthma relievers) and controllers (asthma controller medications)	2	1.5	2	0.75	Valid	0.588	Valid	4	The technique of using an inhaler	0.511	0.000	Good discrimination
10	Techniques for using an inhaler when an inhaler is first prescribed	2	1.5	2	0.75	Not valid	0.298	Not valid	4		0.482	0.000	Good discrimination

CVR = Content validity ratio (Ne−*N*/2)/(*N*−1);
Ne: 1–3 (number of expert judges who gave an assessment) (agree/strongly agree);
N: 3 (sum of all expert judges).

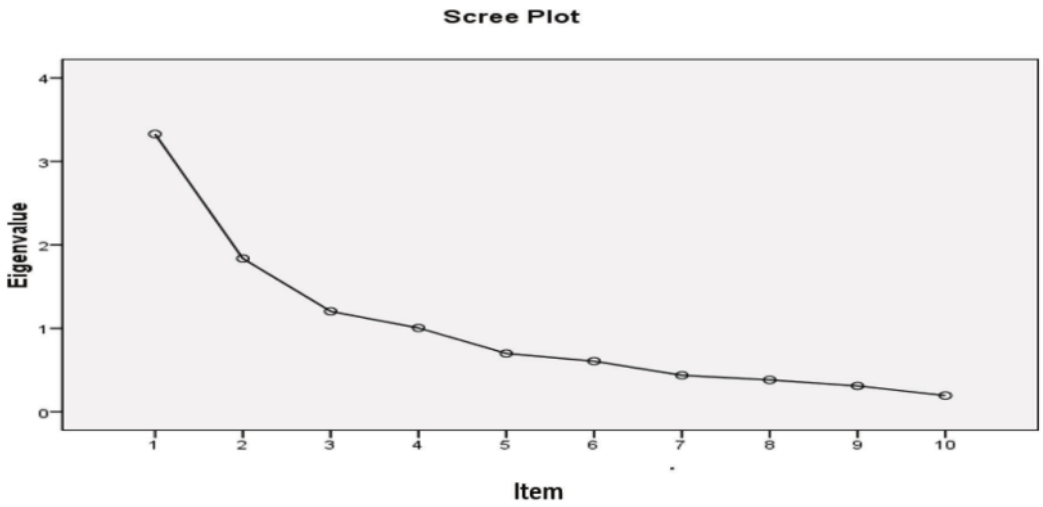

Figure 1. Scree plot graph of the relationship between items and Eigen dimensions (factors).

of 0.750, so it can be said that the items in the questionnaire were reliable or reliably used in data collection tools.

Quantitative phase

Descriptive statistics are part of the statistical science that only collects, processes, presents, and analyzes quantitative data descriptively without making decisions for the population or just looking at the general picture of the data obtained. The average item score per dimension in the pharmacist's role questionnaire on pharmaceutical services in treatment with asthma reliever inhalers is shown in Figure 2; item 8 was the lowest item with a mean value of 3.51, and this showed that they had a smaller role in item 8.

The total category of the pharmacist's role questionnaire on pharmaceutical services in treatment with asthma reliever and controller inhalers in Table 5 showed the frequency and percentage that are evenly distributed. All research samples answered all the items in the questionnaire, with the highest category being in the high category with a frequency of 22 pharmacists (41.5%) and the least category being in the very high category with a frequency of 5 pharmacists (5%).

Dimension 1 category related to asthma monitoring, with the most category being the low category with a frequency of 38 pharmacists (71.7%). Dimension 2 categories related to asthma control, with the most category being the high category with a frequency of 22 pharmacists (41.5%). Dimension 3 categories related to asthma management, with most categories being in the high category with a frequency of 32 pharmacists (60.4%) with a frequency of 4 pharmacists (7.5%). Dimension 4 categories related to inhaler use techniques, with the most categories being in the low category with a frequency of 26 pharmacists (49.1%) (Table 6).

Qualitative phase

The results of this study were obtained by using in-depth interviews with informants as a form of searching for data and direct documentation in the field, which were then analyzed by researchers. In this analysis, the focus of the research was pharmacists who carry out pharmaceutical practices in pharmacies in the Surabaya city area, which were linked by researchers to several elements or problem identification. This study was obtained from various additional information obtained through in-depth interviews to see the response of the research focus on asthma treatment in everyday life. After conducting interviews with the research subjects, the researcher then made a transcript of the interviews and summarized them in a table to further understand the interview theme to match the research title. The results of the interview findings can be seen in Table 7. Descriptive analysis of research data was an analysis of the data obtained from interviews with 12 research subjects, 11 APA and 1 APING, who perform pharmaceutical services at pharmacies in the city of Surabaya.

DISCUSSION

This research used mixed methods which were carried out simultaneously to complement the description of the study results regarding the phenomenon under study to strengthen the research analysis. The study obtained samples that met the inclusion criteria, namely 114 pharmacists. The research sample in this study consisted of 5 men (9%) and 48 women (91%). There have been more women than men over the past 20 years (Carvajal and Popovici, 2018).

a) **Dimension 1** (asthma monitoring). There was a research sample of 38 pharmacists (71.7%) in the low category. Various obstacles to providing asthma counseling including pharmacist time, lack of asthma knowledge, and factors related to patients who did not have confidence in pharmacists were barriers to asthma monitoring (Kritikos *et al*., 2010). Pharmacists should monitor and evaluate to determine the effect of therapy, be aware of drug side effects, and ensure patient compliance. The pharmacist's role was to ensure that the patient had sufficient understanding, knowledge, and skills to follow the treatment regimen and monitoring plan (Dalton & Byrne, 2017).

b) **Dimension 2** (asthma control). There was a research sample of 22 pharmacists (41.5%) in the high category. Pharmacists feel that their role is very important in

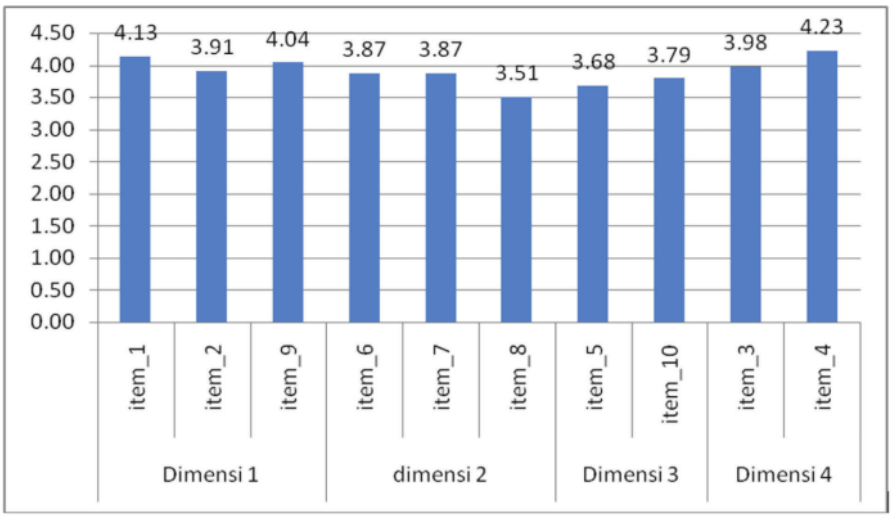

Figure 2. Graph of the average item score per dimension.

Table 5. Categories of total questionnaires (role of pharmacists in pharmaceutical services in asthma management with inhalers).

Category	Interval	Frequency (*n*: 53)	Percentage (%)
Very low	< 35,12	12	22.6
Low	35,13–39,00	14	26.4
High	39,01–42,88	22	41.5
Very high	>42,89	5	9.4

Table 6. Dimensions of pharmacists' perceptions of pharmaceutical services in the treatment of asthma with inhaler preparations.

Dimension (factor)	Dimension	Category	Interval	Frequency (*n*: 53)	Percentage (%)
1	Asthma monitoring	Very low	<10.78	4	7.5
		Low	10.79–12.08	38	71.7
		High	12.09–13.37	5	9.4
		Very high	>13.38	6	11.3
2	Asthma control	Very low	<9.50	7	13.2
		Low	9.51–11.25	18	34.0
		High	11.26–12.99	22	41.5
		Very high	>13.00	6	11.3
3	Asthma management	Very low	<5.91	9	17.0
		Low	5.92–7.47	8	15.1
		High	7.48–9.04	32	60.4
		Very high	>9.05	4	7.5
4	The technique of using an inhaler	Very low	<7.11	8	15.1
		Low	7.12–8.21	26	49.1
		High	8.22–9.31	13	24.5
		Very high	>9.32	6	11.3

Table 7. Pharmacists' perceptions of their role in pharmaceutical services in asthma treatment.

Answer finding	Excerpts of interview results
The role of pharmacists in the treatment of asthma is very necessary to reduce costs (Cost Effectiveness)	"Can reduce the costs incurred, thirdly ... with patient compliance, the patient does not have to go back and forth to the pharmacy, to the doctor to check what his asthma is like, this is much more profitable for the patient because the cost to go here will be much more reduce"
	"What is clear is that the first time they got my recipe here, or my friends here, they must have asked whether they have used it or not? Now that's what we usually have to educate first but it depends on the patient if he doesn't know"
	"We'll tell you how to use it and what are the effects if you don't use it... if you don't follow the rules for use, what... how to use it"
	"The importance of counseling on how to use the inhaler properly and correctly and the dosage and use rules must be adhered to"
	"It's the pharmacist who has to ask...ehh, he has to tell me how to use it, what should he give?"
The role of pharmacists is very important in educating patients about how to use drugs (Patient Education Services)	"Yes, at least we will tell you how to use it, then when to use it"
	"Explain for example how to use inhaler preparations to asthma patients"
	"Especially the reminder for the problem of using the asthma device"
	"We are important for what it's called... giving instructions on how to use it, then if he forgets to use it how and when a sudden attack occurs"
	"If it is necessary to educate the patient, especially how to use the tool"
	"I'll tell you how to use it, then what is the way of storing it maybe, then the dosage, when to use it"
	"If he is a new patient using an inhaler who doesn't understand how to use it, now there are some medicines that have been inhaled, they feel the medicine is not coming out, that's what needs to be informed"
	"It's important, madam, especially in providing counseling on the use of inhalers"
	"It's the pharmacist's job to explain how to use it"
The role of the pharmacist so far has been in terms of monitoring the use of drugs to check the patient's condition (Patient Monitoring Role)	"Usually they come back in about 15 days to ask for the medicine, now that's what we are monitoring, sir, this is the only medicine left, how much do you have left?, how about your compliance, sir?. Usually we ask there.. so every time they repeat. Usually we ask things like: how are you, sir, are you feeling better?, is it reduced or not?"
	"…right, usually someone is supposed to use the inhaler once, spray it once, so he uses it 2–3 times to make it quick, now that might be more of a side effect and maybe use it incorrectly, so it must be monitored"
The role of pharmacists in treating asthma is very important, but because patients feel they already understand how to use drugs, it is difficult for pharmacists to carry out their roles properly (False Belief Patient Assumption)	"Usually, at the pharmacy, we want to provide pharmaceutical services... that's the patient, sometimes we tend to ask questions, he already said he knew how to use it"
	"Hmm sometimes if he has had asthma for a long time... that's right sometimes I like to be inconsequential, I mean inconsequential, I like to treat myself, so I feel like I can do it"
	"Sometimes that person has never used it but his relatives or friends have already told him how to use it"
	"From our point of view, we want to give KIE, they already understand in terms of its use"
	"Usually we ask first how to use it and for how long? have you checked again?"
	"..he can control himself so that his asthma doesn't come back often, so it can improve the patient's quality of life too, right?"
The role of pharmacists in improving asthma patient control in asthma treatment.	"If the patient knows the ways he can control his own asthma, of course he will become less dependent on the drug itself. So the term is yes.. his quality of life is getting better, so that person with him prevents his asthma"
	"Yes, if for example he is aware of his condition, how severe the level of his asthma later will automatically increase the level of control for him who is aware"
	"I think if the patient really understands about asthma, whether it's the cause, how to handle it, I think he can control his asthma well"
	"…his asthma is getting out of control, everywhere he can relapse if he doesn't comply with the reliever medication, Ms."
	"If an asthma patient, hmm, does he really need disciplined treatment, yes, if he is outside the specified schedule, he is not disciplined, of course his asthma is getting worse so that the frequency with which he uses drugs should actually be more and more disobedient"
The role of pharmacists to improve patient compliance is considered low in asthma treatment	"Relapses are more frequent. Then, hmm.. the dose can be even higher, the same can be even more"
	"Low compliance? In my opinion, if he doesn't obey, it's usually because he forgets, then he feels he is healthy, maybe that's the case. Yes, we communicate that even though he is not in a relapse condition, yes, we are motivated to keep taking medication regularly. Because suddenly it happened hmm.. what's the name, like allergens that hit him later will be more so and so.. difficult."
	"That's usually like this, the possibility of frequent attacks, hmm, low compliance means disobedience, maybe the medicine that should be taken is like the one that should contain a controller or the controller that is not used often, maybe it's the corticosteroid which is usually supposed to be used often, if so not used can often occur attacks"

controlling patients' asthma; asthma control carried out by pharmacists can lead to better asthma control and can improve quality of life and reduce costs of hospital care and doctor visits (Bridgeman & Wilken, 2021; Deeks *et al*., 2018). Knowledge of asthma was related to asthma control behavior. Factors related to whether asthma was controlled or not were regular control behavior, the accuracy of the type of drug, the dose of the drug, and the accuracy of the inhalation technique (Azzi *et al.*, 2017). Asthma control aims to eliminate and control asthma symptoms to minimize symptoms of asthma exacerbations and improve and maintain lung function as optimally as possible, avoiding drug side effects (Global Initiative for Asthma, 2021). The pharmacist's role, in this case, is to educate patients by providing information about the type and purpose of asthma treatment, as well as demonstrating the correct use of inhalers, providing information about the use of other asthma devices in the treatment of asthma, asking patients about asthma plans/actions, and monitoring drug use by patients (Bridgeman *et al*., 2021; Deeks *et al*., 2018; Global Initiative for Asthma, 2021).

c) **Dimension 3** (asthma management). There were research samples of 32 pharmacists (60.4%) in the high category. From the results of the dimension test regarding asthma management, pharmacists feel that it is very important for them to be involved in asthma management. In the management of asthma, pharmacists play a role in detecting, preventing, and overcoming drug-related problems that may arise (Bridgeman *et al*., 2021). The importance of the pharmacist's role in the management of asthma, such as providing information and counseling to patients, aims to make patients better understand treatment to improve their adherence and quality of life. In addition, pharmacists play a role in providing drugs and providing recommendations in choosing the right drug based on the patient's condition obtained from the results of counseling with pharmacists and the results of diagnoses from doctors (Bridgeman *et al*., 2021; Deeks *et al*., 2018; Global Initiative for Asthma, 2021).

d) **Dimension 4** (technique of using inhaler). There were 26 pharmacists (49.1%) in the research sample in the low category. Pharmacists play an important role in providing information about the technique of using inhalers. A previous study showed that pharmacists lacked knowledge about the use of inhalers, so it was dangerous for patients to get the wrong information (Azzi *et al.*, 2017; Bridgeman *et al*., 2021; Deeks *et al*., 2018; Global Initiative for Asthma, 2021). The role of pharmacists in the use of inhaler techniques can lead to better drug therapy, reduced health costs, and better asthma control in asthmatic patients (Bridgeman *et al*., 2021; Deeks *et al*., 2018; Global Initiative for Asthma, 2021; Lorensia *et al.*, 2017).

The difference obtained in this study with the research conducted by Kritikos *et al*. (2010), namely the dimensions (factors) that are formed. In this study, pharmacists felt their role in pharmaceutical services in treatment with asthma reliever inhalers along with four main dimensions (factors), namely asthma monitoring, asthma control, inhaler use techniques, and asthma management. Meanwhile, in a study conducted by Kritikos *et al*. (2010), pharmacists felt their role in asthma management along with three main dimensions (factors), namely patient self-management, drug use, and asthma control. In Indonesia, Surabaya city to be precise, a study to increase pharmacist knowledge about how to use inhalers was carried out by Lorensia *et al*. (2017); of the 609 pharmacists visited in Surabaya, only about 25% were willing to attend education until the end. A total of 71 community pharmacists were willing to fill out the initial questionnaire and preliminary study, and 42 pharmacists refused to be given the intervention. Most of the pharmacists who reasoned that they could not continue their research admitted that they were interested in providing education (involved in research) but because of their busy work and difficulties in arranging meeting schedules, they could not continue research. Research by Lorensia *et al*. (2020), who wanted to explore more the barriers to pharmaceutical services for asthma treatment in pharmacies in the Surabaya area, said that pharmacists in asthma pharmaceutical services still had obstacles, namely lack of confidence in skills and counseling for patients. This is admittedly because pharmacists feel they have limited time to review counseling materials related to asthma treatment, including how to use inhalers.

CONCLUSION

The total category of the pharmacist's role questionnaire on pharmaceutical services in treatment with asthma reliever and controller inhalers showed the highest category being in the high category with a frequency of 22 pharmacists (41.5%) and the least category being in the very high category with a frequency of 5 pharmacists (5%).

Pharmacists consider that their roles have been carried out well so far, such as roles related to clinical pharmacy aspects carried out by pharmacists in pharmacies, such as reducing costs in asthma treatment, monitoring/monitoring asthma treatment, and providing information on how to use drugs. Pharmacists also feel their role in aspects of community pharmacy, such as their role in increasing asthma patient compliance and their role in improving asthma patient control. This can be seen by pharmacists who motivate patients to keep taking the medication, and so this can improve patient adherence to using asthma drugs. However, the role of pharmacists cannot be seen in daily practice because of several obstacles that make it difficult for pharmacists to carry out their role in pharmaceutical services, including patients who already understand how to use drugs so that pharmacists assume that patients understand and are reluctant to provide pharmaceutical services. Pharmacists should provide information and education to patients regardless of whether the patient is an old patient, a new patient, a patient who already understands asthma treatment, or a patient who does not understand asthma treatment so that patients better understand the treatment regimen given so that the patients can play a more active role in treatment, and this can improve adherence to using drugs.

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CONFLICTS OF INTEREST

The authors report no financial or any other conflicts of interest in this work.

AUTHOR CONTRIBUTIONS

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work. All the authors are eligible to be an author as per the international committee of medical journal editors (ICMJE) requirements/guidelines.

ETHICAL APPROVALS

This study was approved with Ethical Test No. 024/KE/V/2017 at the Universitas Surabaya.

DATA AVAILABILITY

All data generated and analyzed are included within this research article.

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