Prescribing Pattern of Extemporaneous Compounding in Primary Health Care Centers

Indri Hapsari[1,2], Marchaban[3], Chairun Wiedyaningsih[3] & Susi Ari Kristina[3]

[1] Doctoral Student, Faculty of Pharmacy Universitas Gadjah Mada Yogyakarta, Indonesia

[2] Faculty of Pharmacy, Universitas Muhammadiyah Purwokerto, Indonesia

[3] Faculty of Pharmacy, Universitas Gadjah Mada Yogyakarta, Indonesia

Correspondence: Indri Hapsari, Doctoral Student, Faculty of Pharmacy, Universitas Gadjah Mada, Indonesia; Department of Pharmaceutics and Technology of Pharmacy, Faculty of Pharmacy, Universitas Muhammadiyah Purwokerto, Indonesia. E-mail: indri.h@mail.ugm.ac.id; indrihapsari_ump10@yahoo.co.id

Abstract

Objective: Compounding is one of basic competences and skills should be owned by pharmacists since ages. Shortage of licensed drug supply and patients with special needs had become the major reason for the compounding practice to be performed. Average of drug number given to patients in primary or government health centers in a sheet of prescription compounding was quite high; commonly it included more than one drug given individually or prescribed together. The WHO/INRUD cores drug prescribing indicators were developed to be utilized as a measure of performance in areas related to rational use of medicine in health facilities. This study aimed to analyze prescribing pattern of extemporaneous compounding in primary health care centers.

Method: Cross sectional survey method was employed in this study which was conducted at 24 Primary Health Care Centers in Banyumas regency, Central Java Province, Indonesia by collecting data of extemporaneous compounding from the primary health care centers having the compounding percentage $\geq$ 5% from total prescription of each. The researchers implemented retrospective data collection which was conducted on 1200 prescription sheets in period of April to June 2017.

Result: The drugs used in extemporaneous compounding were 49 types, and the mostly used were chlorpheniramin maleate (22.54%), dexamethasone (18.20%), glycerol guaiacolate (15.36%), amoxicillin (9.15%) and paracetamol (7.47%). Number of drugs used in each extemporaneous compounding was various; one to six drugs per-compounding with its average 2.86 drugs per-prescription of extemporaneous compounding. Generic drugs were mostly used in extemporaneous compounding with percentage 93.88%, while percentage of antibiotic use was low; it was 11.36%. Based on conformity with national formulary in Indonesia, the proper used drug in extemporaneous compounding was 71.43 %, while based on conformity with WHO Model List Essential Medicines, it was 46.96 %.

Conclusion: In this study, although the drug which was used in dosage form of extemporaneous compounding was still quite high with a range between 1 to 6 drugs in one dosage form, but generally the drug use in form of extemporaneous compounding in primary health care centers was still in accordance with the WHO/INRUD cores drug prescribing indicators that were characterized by high generic drugs and low use of antibiotics in the extemporaneous compounding at the primary health care centers.

Keywords: prescribing pattern, extemporaneous compounding, primary health care centers

1. Introduction

Compounding is one of basic competences and skills should be owned by pharmacists since ages. Commonly, changes of chemical dosage form into other forms, from its original form (industrial drug products) were implemented in drug compounding; it was due to request and instruction of compounding personnel based on patients' condition (Giam & McLachlan, 2008). Dosage form of extemporaneous compounding could be in form of oral and also topical (Kristina, Wiedyaningsih, Widyakusuma, & Aditama, 2017; Hapsari, Marchaban, Wiedyaningsih, & Kristina, 2018). Oral dosage can be in form of crushed tablet and capsule content then divided into smaller dosage, or also in form of powders dissolved or suspended into the carrier liquid into an oral liquid

dosage (Brion, Nunn, & Rieutord, 2003), while topical dosage form was commonly dermatology in form of semi-solid of unguenta or cream (Thiers, 1998). In some countries, extemporaneous compounding was known as unlicenced, unauthorized, unapproved or unregistered drugs (Giam & McLachlan, 2008)

Shortage of licensed drug supply and patients with special needs had become the major reason for the compounding practice to be performed. In addition, ease of the drug use, efficiency and also cheaper price were also other reasons why doctors still prescribed extemporaneous compounding to the patients (Pappas, MacPherson, & Stewart, 2002). The shortage of licenced drugs caused the doctors using unlicenced or off label drugs in extemporaneous compounding; usage of unlicenced or off label drugs for pediatric patients is common in some countries (Giam & McLachlan, 2008); such as the case in Rotterdam, where the use of unlicenced drugs for pediatric patients was quite high, especially for patients with complex health cases (Conroy et al., 2000). Although extemporaneous compounding is one of traditional compounding, but until now this compounding technique is still used. On the other hands, extemporaneous compounding also remained a concern, because of unwanted cases such as polypharmacy, medication errors, quality of extemporaneous compounding and also the problem of bacterial contamination that may appear in non-sterile dosage form (Allen, 2003).

A study conducted by Widyaswari and Wiedyaningsih (2012) in primary health care centers in Special Region of Yogyakarta showed that dosage forms of extemporaneous compounding mostly prescribed were chlorpeniramine maleate, glycerol guaiacolate, vitamin C, paracetamol, and vitamin B12 (Widyaswari & Wiedyaningsih, 2012). Another study conducted in University Hospital in Southern Brasil showed the most prescribed unlicenced drugs; the drugs were paracetamol, metoclopramide, dipyrone, ibuprofen and salbutamol (Dos Santos & Heineck, 2012). While a study conducted in Switzerland Pediatric University Hospital showed the most used unlicenced and off label drugs; the drugs were paracetamol, morphine, cholecalciferol, amoxicillin, mefenamic acid and multivitamins (Di Paolo et al., 2006).

In some countries, many researches of prescribing indicators are refered to the WHO/International Network of Rational Use of Drugs (INRUD) cores drug prescribing indicators (Rehan & Lal, 2002; Al-Nasser, 1991; Saleh & Ibrahim, 2006). The WHO/INRUD cores drug prescribing indicators were developed to be utilized as a performance measure in areas related to rational use of medicine at health facilities. These consisted of average number of medicines prescribed per patient encounter, percentage of medicines prescribed by generic name, percentage encounters with an antibiotic prescribed, percentage of encounters with an injection prescribed and percentage of medicines prescribed from an Essential Medicine List (EML) or formulary (World Health Organization [WHO], 1993). A research conducted by Widyaswari and Wiedyaningsih (2012) in primary health care centers in Special Region of Yogyakarta showed that the most prescribed drugs in one dosage form consisted of three types of drugs with average 2.8 drugs per-extemporaneous compounding. The research conducted in Government Health Service Center of India showed average drug use of 2.47, and other study conducted in Government Health Service Center of Saudi Arabia showed average drug use of 2.3 (Widyaswari & Wiedyaningsih, 2012; Rehan & Lal, 2002; Al-Nasser, 1991) Average of drug number given to patients in primary or government health centers in a sheet of prescription, both non-extemporaneous compounding and extemporaneous compounding, was quite high; commonly it included more than one drug given individually or prescribed together. In fact, the more drug amount given to the patients, the more occurrences of polypharmacy and would further increase the occurrence of medication error (Koper, Kamenski, Flamm, Bohmdorfer, & Sonnichsen, 2013). This study aimed to analyze prescribing pattern of extemporaneous compounding in the primary health care centers

2. Methods

2.1 Study Design

This was an observational study using cross sectional descriptive survey method conducted at Primary Health Care Centers in Banyumas Regency, Central Java Province, Indonesia; the period of the research was 3 months (April to June 2017). It included two parts of survey. The researchers used retrospective data collected from April to June 2017 at Primary Health Care Centers in the regency. The prior survey observed percentage of extemporaneous compounding prescription at the public health care centers. The centers would not be involved in the next survey if the percentage felt under 5%. The next survey data explored the compounding prescription at the public health care centers. The further survey was conducted by the researchers using observation to identify the sampled extemporaneous compounding prescription.

2.2 Sample Criteria

The researchers set all extemporaneous compounding found in 28 Primary Health Care Centers in Banyumas Regency, Central Java, Indonesia as the population in this study.

2.2.1 Inclusion Criteria

All extemporaneous compounding prescriptions taken from Primary Health Care Centers in Banyumas Regency, Central Java with a percentage of extemporaneous compounding ≥ 5% prescribed by doctors, midwives and nurses intended for adult and pediatric patients were set as the inclusion criteria based on the prior survey. The data of prior survey were used to select Primary Health Care Centers as its sample based on criteria of extemporaneous compounding in the Primary Health Care Center ≥ 5%.

2.2.2 Exclusion Criteria

Prescriptions without any extemporaneous compounding were set as its exclusion criteria. The researchers excluded Primary Health Care Center with its extemporaneous compounding less than 5% of the total prescriptions in this study. Based on the results of a survey of prescriptions at 28 health centers, there are four Primary Health Care Centers with less than 5% extemporaneous compounding of total prescriptions. Therefore, the four centers are not included in the sampling, so that there are only 24 samples in this study.

Total number of extemporaneous compounding selected is 1200 from 24 primary health care centers. Prescription sampling from each primary health care center is conducted by randomly stratified the data on the number of extemporaneous compounding from survey results of the compounding that have been executed previously.

2.3 Ethical Considerations

The ethical approval of this study was issued by the Ethics Commission of Medical Faculty, Universitas Jendral Soedirman with No.: 2294/UN23.07.5.1/PN.1/2017

2.4 Data Collection and Analysis

The researchers collected research data in stages by collecting prescription samples from the primary health care centers located closest to the researchers to the most remote ones. They involved trained surveyor pharmacists in each sampling at each primary health care center. The data collection was coordinated by the researchers, where in each sampling they participated in the sampling to control and supervise them. The obtained data are written in data collection sheets and then the data are analyzed descriptively and compared with the WHO/INRUD cores drug prescribing indicators for evaluating medicines usages pattern as a measure of performance to rational use of medicine in primary health care centers. The prescribing indicator used in the study consist of average number of medicines prescribed per patient encounter, percentage of medicines prescribed by generic name, percentage encounters with an antibiotic prescribed, percentage of medicines prescribed from an Essential Medicine List (EML) World Health Organization (WHO) and percentage of medicines percribed from an national formulary in Indonesia. Percentage of encounters with an injection prescribed was not analyzed because prescription of extemporaneous compounding used as non-sterile extemporaneous compounding, therefore the injection was not used in non-sterile extemporaneous compounding.

3. Result

Based on the identification result toward 1200 prescription of extemperanous compounding, there were 49 drugs used in extemporaneous compounding in primary health care centers in Banyumas Regency, Central Java. The most drugs used in extemporaneous compounding in the primary health care centers were chlorpheniramin maleate (22.54%), dexamethasone (18.20%), glycerol guaiacolate (15.36%), amoxicillin (9.15%) and paracetamol (7.47%). (Table 1)

The research showed that obtained result between the most prescribed drugs and the drug group had correlation; where the most prescribed drugs would also impact to the prescribed drug group. Based on the result, from the most three prescribed drugs, chlorpheniramin maleate was included into antihistamin group (23.80%), dexamethasone was included into corticosteroids group (21.41%), and glycerol guaiacolate was included into expectorant group (17.07%). (Figure 1)

Table 1. Drugs used in extemporaneous compounding dosage in Primary Health Centers

No.	Drugs	Dosage form	Number	Percentage (%)
1.	Chlorpheniramine maleat	Tablet 4 mg	857	22.54
2.	Dexamethasone	Tablet 0.5 mg	692	18.20
3.	Glyseril guaikolat	Tablet 100 mg	584	15.36
4.	Amoxicillin	Tablet 500 mg	270	9.15
		Suspension 125 mg/ml	78	
5.	Paracetamol	Tablet 500 mg	282	7.47
		Syrup 120 mg/5 ml	2	
6.	Acid ascorbic	Tablet 50 mg	281	7.39
7.	Vitamin B Complex	Tablet	127	3.34
8.	Salbutamol	Tablet 4 mg	112	2.94
9.	Ambroxol	Tablet 30 mg	49	1.47
		Syrup 15 mg/ml	7	
10.	Prednisolone	Tablet 5 mg	49	1.30
11.	Cetirizin	Tablet 10 mg	48	1.26
12.	Pyridoxine (Vitamin B6)	Tablet 10 mg	42	1.11
13.	Calsium laktat	Tablet 500 mg	34	0.90
14.	Molexflu (Paracetamol, Phenylpropalonamine HCl, Chlorpheniramine maleat)	Tablet	30	0.80
15.	Metil Prednisolon	Tablet 4mg, 8 mg	29	0.76
16.	Hydrocortisone	Cream or oinment 1%, 2.5%	26	0.68
17.	Gentamycin	Cream or ointment 0.1%	23	0.60
18.	Betamethasone	Cream 1 %	18	0.47
19.	Cefadroxil	Tablet 500 mg	12	0.42
		Suspension 125 mg/ 5 ml	4	
20.	Domperidon	Tablet 10 mg	15	0.40
21.	Ibuprofen	Tablet 200 mg	14	0.40
		Suspension 100 mg/5ml	1	
22.	Antasida	Tablet 500 mg	13	0.37
		Suspension 200 mg/5ml	1	
23.	Asam mefenamat	Tablet 500 mg	9	0.24
24.	Oxytetracyclin	Cream or ointment 3%	9	0.24
25.	Thiamine (Vitamin B1)	Tablet25 mg	8	0.21
26.	N- Asetilsistein	Capsul 200 mg	6	0.16
27.	Miconazole	Cream 2 %	6	0.16
28.	Cyanocobalamine (Vitamin B12)	Tablet 50 mcg	6	0.16
29.	Acyclovir	Tablet 400 mg	4	0.13
		Cream 5 %	1	
30.	Metronidazole	Tablet 500 mg	5	0.13
31.	Cotrimoxazole (sulfamethoxazole + trimethoprim)	Tablet 480 mg	5	0.13

32.	Ketoconazole	Cream 2%	5	0.13
33.	Ephedrin	Tablet 12.5 mg	5	0.13
34.	Thiamphenicol	Tablet 500 mg	4	0.10
35.	Ranitidin	Tablet 150 mg	4	0.10
36.	Eritromycin	Tablet 500 mg	1	0.10
		Suspension 200 mg/5ml	3	
37.	Cefixime	Tablet 100 mg, 200 mg	3	0.07
38.	Zink	Tablet 20 mg	3	0.07
39.	Chloramphenicol	Capsul 250 mg	2	0.07
		Syrup 125 mg/5ml	1	
40.	Albendazole	Tablet 400 mg	2	0.05
41.	Obat Batuk Hitam	Solutio 100 ml	2	0.05
42.	Papaverin	Tablet 10 mg	1	0.03
43.	Aminophilin	Tablet 200 mg	1	0.03
44.	Diazepam	Tablet5 mg	1	0.03
45.	Bromheksin	Tablet 4 mg	1	0.03
46.	Clindamycin	Cream 1 %	1	0.03
47.	Scabimide (Permethrin)	Cream 5 %	1	0.03
48.	Captopril	Tablet 25 mg	1	0.03
49.	Dimenhidrinat	Tablet 50 mg	1	0.03
Total			3802	100

The dosage form which was made based on instruction of prescription writer in primary health care centers in Banyumas regency, Central Java were in three dosage forms namely *puyer* (crushed tablet), suspension and oinment/cream. Puyer consisted of 1 to 6 drugs, suspension consisted of 2 to 5 drugs, and ointment/cream consisted of 2 to 3 drugs. Figure 2 showed drug numbers that were mostly available in one compounding dosage; it was 3 drugs (46.05%) with average number of drug use per-compounding dosage forms were 2.89 (Table 3).

Based on conformity with national formulary in Indonesia, the drugs used in extemporaneous compounding dosage made in the primary health care centers had met conformity percentage of 71.43%, while based on WHO Model List of Essential Medicine (EML), the drugs used in extemporaneous compounding that had met the conformity was 46.96% (Table 3). Table 3 also showed that generic drugs (93.88%) were used in extemporaneous compounding at the primary health care centers, and antibiotic use was 11.36%.
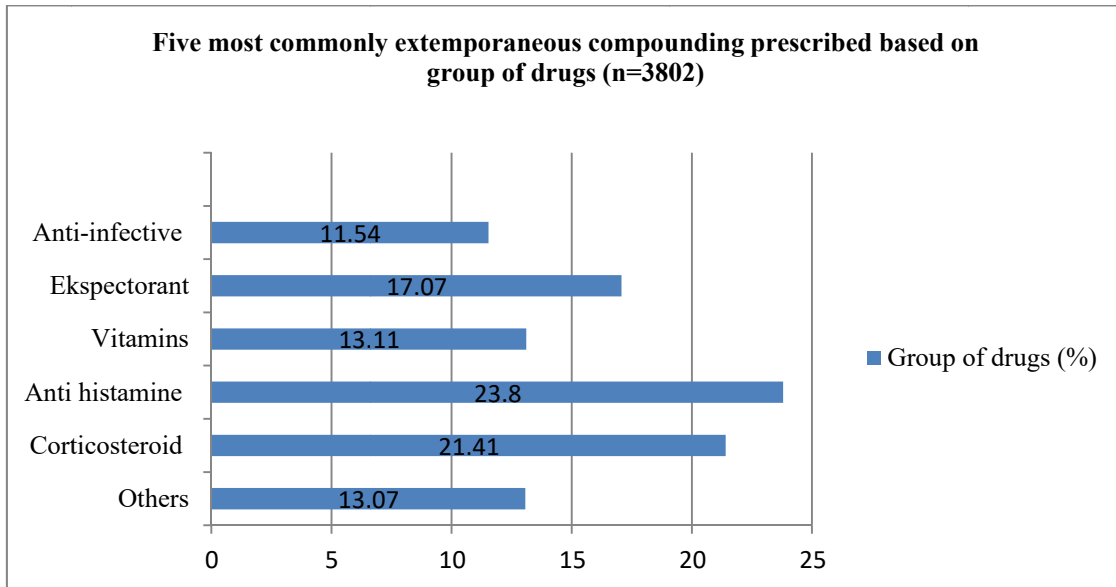
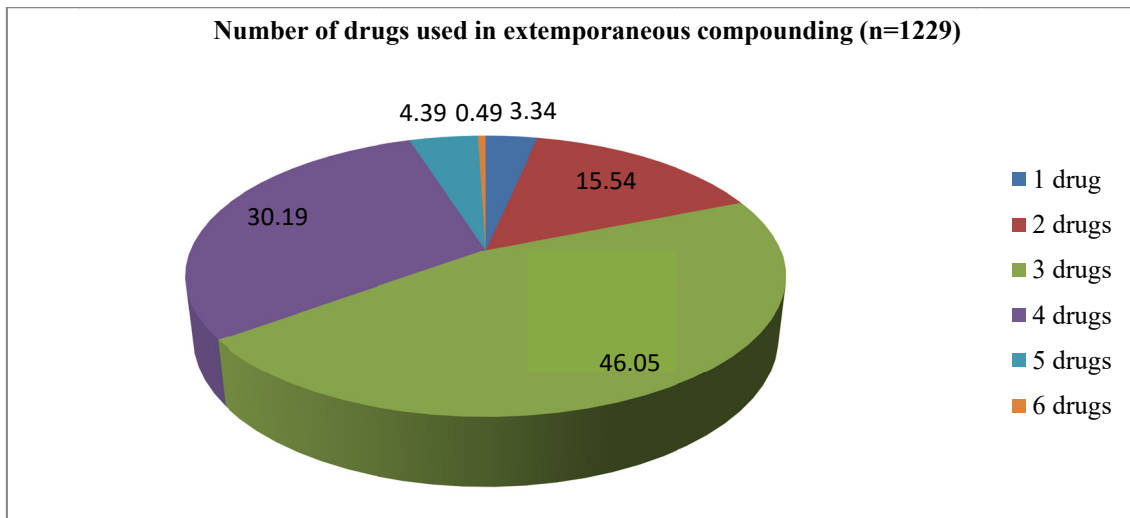**Five most commonly extemporaneous compounding prescribed based on group of drugs (n=3802)**

Group	Value
Anti-infective	11.54
Ekspectorant	17.07
Vitamins	13.11
Anti histamine	23.8
Corticosteroid	21.41
Others	13.07

■ Group of drugs (%)

Figure 1. Five most commonly extemporaneous compounding prescribed based on group of drugs

Number of drugs used in extemporaneous compounding (n=1229)

Legend	Value
■ 1 drug	3.34
■ 2 drugs	15.54
■ 3 drugs	46.05
■ 4 drugs	30.19
■ 5 drugs	4.39
■ 6 drugs	0.49

Figure 2. Number of drugs used in extemporaneous compounding

Table 2. Check list conformity of drugs used in extemporaneous compounding with the National Formulary in Indonesia and WHO Model List of Essential Medicines

No.	Drugs	Dosage form	National Formulary in Indonesia (Health Facility-Level I)	WHO Model List of Essential Medicines
1.	Chlorpheniramine maleat	Tablet 4 mg	-	-
2.	Dexamethasone	Tablet 0.5 mg	√	√
3.	Glyseril guaikolat	Tablet 100 mg	-	-
4.	Amoxicillin	Tablet 500 mg Suspension 125 mg/ml	√	√
5.	Paracetamol	Tablet 500 mg Syrup 120 mg/5 ml	√	√
6.	Acid ascorbic	Tablet 50 mg	√	√
7.	Vitamin B Complex	Tablet	√	-
8.	Salbutamol	Tablet 4 mg	√	√
9.	Ambroxol	Tablet 30 mg Syrup 15 mg/ml	-	-
10.	Prednisolone	Tablet 5 mg	√	√
11.	Cetirizin	Tablet 10 mg	-	-
12.	Pyridoxine (Vitamin B6)	Tablet 10 mg	√	√
13.	Calsium laktat (Kalk)	Tablet 500 mg	√	√
14.	Molexflu (Paracetamol, Phenylpropalonamine HCl, Chlorpheniramine maleat)	Tablet	-	-
15.	Metil Prednisolon	Tablet 4mg, 8 mg	-	-
16.	Hydrocortisone	Cream or oinment 1%, 2.5%	√	√
17.	Gentamycin (salep mata, inj)	Cream or ointment 0.1%	-	-
18.	Betamethasone	Cream 0.1 %	√	√
19.	Cefadroxil	Tablet/kapsul 500 mg Suspension 125 mg/ 5 ml	√	-
20.	Domperidon	Tablet 10 mg	√	-
21.	Ibuprofen	Tablet 200 mg Suspension 100 mg/5ml	√	√
22.	Antasida	Tablet 500 mg Suspension 200 mg/5ml	√	-
23.	Asam mefenamat	Tablet/kapsul 500 mg	√	-
24.	Oxytetracyclin (inj)	Cream or ointment 3%	-	-
25.	Thiamine (Vitamin B1)	Tablet 25 mg	√	-
26.	N- Asetilsistein	Capsul 200 mg	√	-
27.	Miconazole	Cream 2 %	√	√
28.	Cyanocobalamine (Vitamin B12)	Tablet 50 mcg	√	-
29.	Acyclovir	Tablet 400 mg Cream 5 %	√	√

No.				
30.	Metronidazole	Tablet 500 mg	√	√
31.	Cotrimoxazole (sulfamethoxazole + trimethoprim)	Tablet 480 mg	√	√
32.	Ketoconazole	Cream 2%	√	-
33.	Ephedrin (inj)	Tablet 12.5 mg	-	-
34.	Thiamphenicol	Tablet 500 mg	-	-
35.	Ranitidin	Tablet 150 mg	√	√
36.	Eritromycin	Tablet 500 mg Dry sirup 200 mg/5ml	√	√
37.	Cefixime	Tablet 100 mg, 200 mg	√	√
38.	Zink	Tablet 20 mg	√	√
39.	Chloramphenicol	Capsul 250 mg Suspensi 125 mg/5ml	√	√
40.	Albendazole	Tablet 400 mg	√	√
41.	*Obat Batuk Hitam*	Solutio 100 ml	-	-
42.	Papaverin	Tablet 10 mg	-	-
43.	Aminophilin	Tablet 200 mg	√	-
44.	Diazepam	Tablet 5 mg	√	√
45.	Bromheksin	Tablet 4 mg	-	-
46.	Clindamycin (kaps/tab)inj	Cream 1 %	-	-
47.	Scabimide (Permethrin)	Cream 5 %	√	√
48.	Captopril	Tablet 25 mg	√	-
49.	Dimenhidrinat	Tablet 50 mg	√	-
Total			35	23

Table 3. The use of drugs in extemporaneous compounding in Primary Health Care Centers based on WHO/INRUD cores drug prescribing indicators

No.	Indicators	Value
1.	Average number of medicines prescribed per patient encounter	2.86
2.	Percentage of medicines prescribed by generic name	93.88 %
3.	Percentage encounters with an antibiotic prescribed	11.36%
4.	Percentage of medicines percribed from an Essential Medicine List (EML)	46.96%
5.	Percentage of medicines percribed from an national formulary	71.43 %

4. Discussion

Based on the identification result of extemporaneous compounding in the primary health care centers, it consisted of 1 to 6 drugs with the highest percentage from 3 drugs (46.05%) with the average 2.86 drugs per-prescription, the result was in line with the study conducted by Widyasari and Wiedyaningsih (2012) in Special Region of Yogyakarta; it showed 3 drugs in one compounding dosage in common with average 2.8 drugs per-compounding prescription(Widyaswari & Wiedyaningsih, 2012). Comparing to the standard of WHO, the average of extemporaneous compounding was still high because the standard was 1.6-1.8 (World Health Organization [WHO], 1993). The number of prescribed drugs in a prescription sheet per-patient made in primary health care centers in some countries such as India was 2.47 and Saudi Arabia was 2.30; it was almost the same with Indonesia; 2 to 3 drugs in a extemporaneous compounding. The drug numbers in the countries were higher compared to the average drugs (1 to 2 per-prescriptions) in the following countries: Spain (1.31), French (1.50) and Italia (1.46)

(O'Brien, 1984). The average drug number given in Indonesia was quite high compared to other countries, it could cause polypharmacy and increase medication error cases (Koper et al., 2013). In addition, extemporaneous compounding drugs (unlicenced drugs) given to pediatric patients often correlated to adverse drug reaction cases, it because the available licenced drugs usually were not formulated for pediatric patients, so conformation on dose, dosage form, and procedure were required for the patients (Wiedyaningsih, Hakimi, Soenarto, & Suryawat, 2016).

The mostly prescribed drugs in primary health care centers in Banyumas regency were chlorpheniramine maleate, dexamethasone, glycerol guaiacolate, amoxicillin and paracetamol. These results were similar to prescribing patterns conducted by Widyasari & Wiedyaningsih in primary health care centers in Special Region of Yogyakarta (2012); it found that the mostly prescribed drugs were chlorpheniramine maleate, glycerol guaiacolate, vitamin C, and paracetamol, but the antibiotic use in primary health care centers in Yogyakarta was relatively lower (Widyaswari & Wiedyaningsih, 2012). Comparing to extemporaneous compounding done in some countries such as Netherland and Switzerland; there was similar drugs that were mostly prescribed paracetamol dan amoxicillin, while in Brasil, the mostly prescribed drug was paracetamol (Dos Santos & Heineck, 2012; Di Paolo et al., 2006; 't Jong et al., 2002)

Viewed from mostly prescribed drug groups, there were groups of antihistamine, antiinfektive, expectorant, corticosteroid and vitamins. The drug group used in extemporaneous compounding in centers in Banyumas regency, Central Java were almost the same with the drug group prescribed in primary health care centers in Saudi Arabia; the groups were analgetics, antipyretics, vitamin and cough medications. It because most patients in the country were diagnosed Upper Respiratory Tract Infection (Al-Nasser, 1991).

The antibiotic use in the primary health care centers was 11.36%. Comparing to standard of WHO, the prescription of antibiotic for countries which prevalent with infection cases was in between 15-20% (World Health Organization [WHO], 1993), so antibiotic use in the primary health care centers was low. It decreased significantly comparing to the antibiotic use in Indonesia a few years ago; it was 43.0% in 1993 (World Health Organization [WHO], 1996). The low use of antibiotic also happened in primary health care centers in Malaysia (23.2%) (Saleh & Ibrahim, 2006)]. The countries with high antibiotic use were Bahrain (45.8%) (Otoom, Culligan, Al-Assoomi, & Al-Ansari, 2010) and also Kamboja (66%) (Chareonkul, Khun, & Boonshuyar, 2002). One of the reasons why antibiotic used in high dose was because of doctors and patients' willingness to recover more quickly from illnesses, but it actually reffered to the symptoms only, not the diagnosis (Saleh & Ibrahim, 2006). The antibiotic use with high dose could cause antibiotic resistence; this not only affected the severity of patients' clinical condition, but also had an economic impact which will cost more because the deseases were possibly getting worse or even not healed at all.

The drug use in the primary health care centers in Banyumas regency, Central Java were mostly in form of generic drugs (93.88%); 3 of 49 prescribed drugs were not generic (two oral dosage namely Molexflu, *Obat Batuk Hitam*) and one more topical dosage namely Scabimite. A high percentage of generic drugs usage in primary health care centers indicated that they had followed Health Ministerial Regulation in 2010 about the obligation of prescribing generic drugs by doctors at government health service facilities. It also because the primary health cares centers were in the first level of government health service facility as the gate keeper in health services in Indonesia. In addition, with the limited budget, so that drugs used in the primary health care centers were mostly in form of qualified generic drugs with a cheap price and affordable to the community.

Based on the drug use conformity in extemporaneous compounding done in primary health care centers in Banyumas regency-Central Java with the national formulary of Indonesia for the first level of health service facility (Kementerian Kesehatan Republik Indonesia [Kemenkes RI], 2017), it met the percentage of conformity of 71.43%; 35 of 49 drugs used in extemporaneous compounding had been appropriate with the national formulary in Indonesia. The existence of 28.57% incompatibility between the drugs used in prescription with the national formulary because there was a policy from the regional health office where the drugs used or prescribed by each primary health center refered to the Formulary Drug of Basic Health Care (FOPKD) in the primary health care centers made and issued by the regional health office in each region. The FOPKD in each primary health care center refered to the national formulary, consequently most drugs on FOPKD were also available on the national formulary, although some drugs were not same because they should be conformed to condition of each primary health care center or the region (Departemen Kesehatan Republik Indonesia [Depkes RI], 2007). While based on drug list of WHO Model List Essential Medicines 2017, drug conformity which was used was 46,96% (World Health Organization [WHO], 2011). It because there were some drugs in the list that were not same in dosage form used in extemporaneous compounding such as clindamycin which was available in form of cream, but in WHO Model List Essential Medicines 2017 it was in form of tablet/capsule and injection. It was possible because

prescription of extemporaneous compounding used as the research sample was non-sterile extemporaneous compounding both in form of oral and topical dosages, so the injection dosage was not used in non-sterile extemporaneous compounding.

Existence of most similiarity between Indonesian national formulary and WHO Model List Essential Medicines was because it is functioned as reference source in arranging the national formulary, although there were some drugs did not exist in WHO Model List Essential Medicines, because the national formulary was the list of selected drugs needed and should be available in health service facilities in implementing National Health Insurance, so it was adjusted with the needs of Indonesian community. In addition, there are several criteria used, such as having good efficacy and safety based on current and valid scientific evidence, having benefit-risk that was most beneficial for patients, having authorized licenses approved by BPOM (Indonesian National Agency of Drug and Food Control) and having a cost beneficial ratio (Kementerian Kesehatan Republik Indonesia [Kemenkes RI], 2016). Overall, viewed from the drugs used in extemporaneous compounding, mostly they were not in accordance yet with WHO Model List Essential Medicines 2017; there were only 23 appropriate drugs. It showed the essential drugs that should be available in primary health care centers were relatively still limited. In fact, patients had their own right to use essential drugs available in health care facilities. Inappropriateness in health treatment and prescribing in primary health care centers could have a wide impact on health services for community, because they were the main gateway in providing health services in the community.

The researchers were able to obtain 1200 samples of prescriptions in 24 Primary Health Care Centers although the study was conducted only in a regency located in Central Java, Indonesia; generally, it is expected to describe prescribing pattern of extemporaneous compounding done in Primary Health Care Centers in Indonesia. The research limitation was that the researchers did not collect the samples in other community pharmacy including drugstores (pharmacies), clinics, and hospitals.

5. Conclusion

In this study, although the drug which was used in dosage form of extemporaneous compounding was still quite high with a range between 1 to 6 drugs in one dosage form, but generally the drug use in form of extemporaneous compounding in primary health care centers was still in accordance with the WHO/INRUD cores drug prescribing indicators that were characterized by high generic drugs and low use of antibiotics in the extemporaneous compounding at the primary health care centers.

Acknowledgements

Conflicts of Interest

The researchers state that there are no conflicts of interest in this study.

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