



Research Article

Counterfeit Herbal Medicine adulterated with chemical drugs in Indonesia: NADFC Public warning 2011-2014

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Herbal medicine is widely used in Indonesia. Thus, counterfeit herbal medicines are a great concern given the negative impact to individual and population health. This paper used data drawn from the National Agency of Drug and Food Control (NADFC/BPOM) of Indonesia to describe the counterfeit trend against registered herbal drugs from 2011 to 2014, and further analyses were performed to discover the types of the fraud, the impact to the health and conventional drugs that could be used as substitutes for herbal drugs. The research found that the amount of falsified medicines is increasing along with the increasing number of registered herbal drugs. From the data obtained, similar falsified herbal drugs were identified for both life style drugs (51%) and health-related condition drugs (49%). In addition, almost all falsified herbal drugs are adulterations plus tampering (81%). The most significant substitute chemical drug is paracetamol.

Keywords: Counterfeit, herbal medicines, public health, chemical drugs, adulterants.

INTRODUCTION

In Indonesia, popular herbal medicines, such as *jamu*, have been well known for up to 15 to 16 decades or longer. For example, *jamu* has been used in Indonesia since 722 AD, during the Hindu-Buddha kingdom. A relief in the Borobudur temple depicted people consuming *jamu* to protect their health. An inscription from the *Majapahit* kingdom (1293) named *Acaraki*, also exists that described a traditional Indonesian herbalist (Aditama TY, 2015).

Similar to *Jamu* in Indonesia, various traditional medicines are also used in several countries, such as *Ayurveda* and *unani* in India and Bangladesh, *Sowa* in Nepal and Sri Lanka, *Rigpa* in Bhutan, *Koryo* in Korea, *Dhivehbeys* in Maldives, *Myanmar TM* in Myanmar, and *Thai TM* in Thailand (WHO, 2014). Although still not widely accepted, herbal medicine is being taught in several medical schools and pharmacy schools, Herbal therapy is practiced by a range of health professionals, from

herbalists to chiropractors to naturopathic doctors, they can help people create treatment plans that use herbs, conventional medications, and lifestyle drugs that can promote healthy life.

By definition, traditional medicine products include herbs, herbal material, herbal preparations and finished herbal products that contain parts of plants, other plant materials or any combination thereof as active ingredients. In some countries, herbal medicines may contain natural organic or inorganic active ingredients that are not of a plant origin (e.g., animal and mineral materials) (WHO, 2005). Herbal drugs are naturally occurring, plant-derived substances with minimal or no industrial processing that have been used to treat illness within local or regional healing practices (Tilburt and Kaptchuk, 2008).

In Indonesia, approximately 15.7 % of households in Indonesia have herbal medicines at home as many as 30.4 % of the Indonesian population commonly uses

herbal medicine, given its cultural and historical influence. In several rural areas, traditional medicine is one of the primary sources of health care (RISKESDAS, 2010). In the more well-established cities, herbal medicines are used by people to self-cure or to increase health quality (complementary therapy) if a cure is not possible.

In 2014, 2076 herbal medicines were registered compared with approximately 2384 registered herbal medicines that people safely consume in 2013 (NADFC, 2012). According to basic health research in 2010 in Indonesia, approximately 4.36 % of people over 15 years old consume *jamu* daily, and 45.17% consume *jamu* occasionally (RISKESDAS, 2010). According to Health law number 23 year 1992 of article 47, the National Health System continues to provide guidance and counseling regarding efficacious herbal remedies used in community health (Health law RI, 1992).

The notion that herbal medicines are naturally safe is not necessarily true; the risks are always associated with both herbal and conventional medicines.

The National Agency of Drug and Food Control Indonesia (NADFC/BPOM) is the chief pharmaceutical monitoring agency in Indonesia that is responsible for approval of medicines for mass distribution, informing citizens of the threat posed by counterfeit drugs and providing regulatory oversight for drug production. According to BPOM, to gain approval to market new drugs, companies must demonstrate an ability to guarantee the safety, quality and efficacy of the products. Companies must also comply with good quality, manufacturing and vigilance practices for manufacturing products already on the market (BPOM/NADFC, 2013).

In February 2006, the World Health Organization (WHO) created the first global partnership known as the International Medicinal Products Anti-Counterfeiting Taskforce (IMPACT) to combat counterfeit medicines. Approximately 193 WHO member states joined on a voluntary basis, including international organizations (IMPACT, 2009).

In addition to locally cooperating with the Republic of Indonesia Police, NADFC also joined the International Agency for combating counterfeit pharmaceuticals. To more effectively combat counterfeit medicines and increase awareness about the problem, Indonesia first worked in cooperation with IMPACT in 2008 in Operation Storm I. Operation Storm helped South East Asian countries battle counterfeit medicines. Indonesia was also involved in Operation Pangea, which aims to combat the trade of counterfeit medicines over the internet. Indonesia joined operation Pangea IV in 2011 and continues to collaborate with INTERPOL and several agencies, such as the World Customs Organization (WCO), The Permanent Forum of Enforcement International Pharmaceutical Crime (PFIPC), and the Head of Medicines Agencies Working Group of Enforcement Officers (WGEO) (INTERPOL, 2014).

Operation Pangea in Indonesia targets internet sales of counterfeit and substandard drugs, traditional drugs, cosmetic and health supplements as well as illegal and fake medical equipment (Aditama, 2014).

Counterfeit medicines have the potential to reach 70% of the global drug market (NADFC, 2015). Similar to other products, counterfeit medicines exist because there is a large market for the authentic original product and the profit margins on sales of the falsified medicines are high. Counterfeit medicines most likely exploit high price genuine drugs. A significant amount of counterfeit drugs is lifestyle medicines. Do falsified herbal medicines exhibit similar trends as counterfeit conventional medicines? In this paper, the author analyzed the trends of falsified herbal medicines in Indonesia from 2011 to 2014 by categorizing the falsified herbal medicines based on the type of fraud medicine incidence and the type of drug. At the end of the study, I compared the trends between fake herbal drugs and registered herbal drugs during the 4-year interval from 2011 to 2014.

The advantage of using herbal medicines compared to conventional medicine are less side effect, herbal medicines have mechanism that can ward or neutralized medicines side effect known as SEES (side effect eliminating substance). For example, in the sugar cane (*saccharum officinarum*) there is saccharin compound that can be used as anti-diabetic, therefore, diabetic patients are allowed to consume sugar cane juice, but patients are prohibited to consume sugar, despite of sugar is purified from sugar cane juice. Although the long glorious success history of herbal medicines, the risk-benefits of herbal medicines in Indonesia need to be assessed deeper, to answer the question the safety and effectiveness of herbal medicines.

METHODS

This study used data about falsified herbal drugs and registered herbal drugs from 2011 to 2014. To acquire the relevant data set, the author utilized database systems managed by the NADFC/BPOM Republic of Indonesia (cekbpom.pom.go.id) and the Ministry of Health Republic of Indonesia database for falsified herbal drugs.

Data use granted by *Pejabat pengelola informasi* BPOM (Information management office NADFC); Number : BPOM-16.01/03/06/2016. The database from the BPOM official website collects detailed reliable information on medicines, herbal medicines, cosmetics, food supplements and animal feed. The NADFC/BPOM database also has lists of drug-producing companies and several links related to drug and food control.

For a visual presentation, the author utilized a counterfeit herbal medicine public warning list released by the BPOM from 2011 to 2014 for analysis (Table 1). The table categorized traditional drugs based on their labeling package claims, traditional use, type of conventional

Table 1. Table analysis of counterfeit herbal drugs based on labeling package claims, botanical name of active ingredients, type of medicines and adulterants and tampering type.

No	Counterfeit herbal medicines brand in 2011	Biology name	Traditionally used for	Chemical drugs Adulterants	Type of medicine	Types Tampering
1	Poten-Zhi Kapsul (sex medicine capsule poten-Zhi)	Eurycomae radix extractum, Cordyceps lucidum, buteae superba extractum	Sex medicine	Tadalafil	Lifestyle	-
2	Asamurat nyeri tulang cap gunung krakatau serbuk (gout drug powder)	Moringae folium, cucumae rhizoma, oridalis radix, glycyrhiza radix, Dioscoreae rhizoma	Gout	Paracetamol and Phenylbutazone	Health-problem	Fake BPOM/NADFC registered number
3	Buah naga kapsul (capsule buah naga)	Hylocereus undatus	Supplement Immunity	Paracetamol and Phenylbutazone	Lifestyle	Fake BPOM/NADFC registered number
4	Dewa dewi kapsul (capsule Dewa dewi)	Phaleria macrocarpa	Gout	Paracetamol	Lifestyle	Fake BPOM/NADFC registered number
5	Jamu cap putri sakti penyehat badan (supplement cap putri sakti tablet)	Andrographis paniculata, Valerina javanica, Zingiber zerumbet, Phaleria macroclainapa, Piper retrofractum, Alstonia scolaris	Diet	Phenylbutazone	Lifestyle	Fake BPOM/NADFC registered number
6	Jamu tradisional jawa asli cap putri sakti (diet pill traditional jamu cap putri sakti)	Andrographis paniculata, Valerina javanica, Zingiber zerumbet, Phaleria macroclainapa, Piper retrofractum, Alstonia scolaris	Diet	Phenylbutazone	Lifestyle	Fake BPOM/NADFC registered number
7	Kapsul telat bulan (Tiauw keng poo sae) (capsule for missed periods tjauw keng poo sae)	Curcuma longa	Sex medicine	Paracetamol	Lifestyle	Fake BPOM/NADFC registered number
8	Kuat tahan lama surabaya madura serbuk (erectile disfunction drug powder Surabaya Madura)	Eurycoma longifolia	Sex medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number
9	Lebah mutiara asam urat kapsul (gout capsule Lebah mutiara)	Centeli asiatica, Glaziosa superbal, Minosa pudical, Phyllantnusurinaha lin, Sonchus arcesisi.	Gout	paracetamol	Health-problem	Fake BPOM/NADFC registered number
10	Lebah mutiara gatal gatal kapsul (anti pruritic lebah mutiara capsule)	Trigona sp	Skin	Paracetamol	Health-problem	Fake BPOM/NADFC registered number
11	linurat kapsul (gout capsule)	Curcumae rhizome, Dioscoreae rhizome, Cordialis radix	Gout	Piroxicam	Health-problem	Fake BPOM/NADFC registered number
12	MD dan SM obat asam urat nyeri tulang (gout medicines MD and SM)	Dioscoreae rhizome, Cordialis radix, Curcumae rhizome,	Gout	Paracetamol and Phenylbutazone	Health-problem	Fake BPOM/NADFC registered number
13	Obat kuat dan tahan lama powermasn kapsul (erectile dysfunction powerman capsule)	Eurycoma longifolia	Sex medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number

Table 1. Cont.

14	Obat kuat dan tahan lama suer x kapsul (erectile dysfunction suerx capsule)	Synnathoides biaculeatus	Sex medicine	Sildenafil citrate and paracetamol	Lifestyle	Fake BPOM/NADFC registered number
15	Pil anti sakit gigi plus pak tani tablet (analgesic for tooth pain pak tani tablet)	Dipernigrum, allium sativum	Analgesic	Paracetamol	Health-problem	Fake BPOM/NADFC registered number
16	Prima setia kapsul (sex medicine capsule prima sakti)	Flavonoid glicosade, panax ginseng, tribulus, zingiberis rhizome, curcuma rhizoma	Sex medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number
17	Scorpion kapsul (sex medicine capsule scorpion)	Sanrego, Radix ginseng, radix notoginseng, Herba epi medii, radix Anglinecae sinensis.	Sex medicine	paracetamol	Health-problem	Fake BPOM/NADFC registered number
18	Spider kapsul (sex medicine spider)	Panax ginseng, rhizome, tribuus terestris tructus, corni fructus, muira puama, Gonoderm a.	Sex medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number
19	Tangkur cobra laut flu tulang kapsul (analgesic Cobra laut capsule)	Miristica Fragens extract, Ginseng rdix, Yohimbin, Zingiberis rhizome, curcumae rhizomae.	Sex medicine	Sildenafil citrate and Natrium Diclofenac	Lifestyle	Fake BPOM/NADFC registered number
20	Tiger fit asam urat flu tulang (analgesic and gout Tiger fit capsule)	Centella asiatica, Gloriosa suoerbal, mimosa publical. Phylanus Urina lialin.	Gout	Paracetamol	Health-problem	Fake BPOM/NADFC registered number
21	Power up kapsul(sex medicines power up capsule)	Panax araliaceae	Sex medicine	Sildenafil citrate	Lifestyle	-

No	Counterfeit herbal medicine brands in 2012		Traditionall y use for	Substitute medicine	Type of Medicines	Type of Tampering
1	ABC Acai Berry kapsul lunak (soft capsule acai berry)	Euterpe oleracea	Diet	Supplement imunbutramine hydrochloride	Lifestyle	-
2	Pegal linu prono jiwo cairan obat dalam TR 053651401 (analgesic capsule jiwo cairan)	Stercula javanica	Analgesic	Phenylbutazone	Health-problem	-
3	Labaik kapsul (labaik Gout capsule)	Sidarhombifolia, orthosiphon aristatus	Gout	paracetamol, Phenylbutazone, Methampyrone	Health-problem	Fake BPOM/NADFC registered number
4	Remasyah serbuk (remasyah Gout capsule)	Beehive, erycoma longifolia.	Gout	Phenylbutazone, Piroxicam	Health-problem	Fake BPOM/NADFC registered number
5	Obat kuat dan tahan lama sarang madu (erectile dysfunction medicine tahan lama sarang madu)	Phaleria macrocarpa	Sex medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number
6	Asam urat flu tulang mahkota dewa as kapsul (mahkota dewa gout capsule)	Centeli asiatica, Glaziosa superbal, Minosa pudical, Phyllanthusurinaha lin, Sonchus arcesisi.	Gout	Paracetamol	Health-problem	Fake BPOM/NADFC registered number

Table 1. Cont.

7	Raga prima tablet asam urat(gout tablet raga prima)	Centeli asiatica, Glaziosa superbal, Minosa pudical, Phyllantnusurinaha lin, Sonchus arcesisi.	Gout	Paracetamol	Health-problem	Fake BPOM/NADFC registered number
8	Daun bidara jamu asam urat pegal linu plus sakit gigi (analgesic and gout jamu daun bidara)	Merremia mammosa	Gout	Natrium Diclofenac and paracetamol	Health-problem	Fake BPOM/NADFC registered number
9	Neo rematik (rheumatic capsule)	Brugmansia suaveolens, Orthosiphon aristatus, Justicia gedarusa.	Gout	Paracetamol prednisone	Health-problem	Fake BPOM/NADFC registered number
10	Teratai putih kasul (pill for cancer teratai putih)	Nymphaea	Cancer	Paracetamol and sodium diclofenac	Health-problem	Fake BPOM/NADFC registered number
11	Penyehat badan cap kuda laut (supplement cap kuda laut)	Imperata cylindrica	Supplement Immunity	Proheptadin hydrochloride	Lifestyle	Fake BPOM/NADFC registered number
12	Alfa salam batuk pilek (cough and flu Alfa salam)	Kaemferia galangal, curcuma longa	cough	Paracetamol	Health-problem	Fake BPOM/NADFC registered number
13	Kupu kupu malam serbuk (sex medicine kupu-kupu malam)	Epimedium sagitatum	Sex medicine	Tadalafil	Lifestyle	Fake BPOM/NADFC registered number
14	Rhemalin (gout medicine rheumalin)	Brugmansia suaveolens, Justicia gendarusa	Gout	Piroxicam, paracetamol and Caffeine	Health-problem	Fake BPOM/NADFC registered number
15	Jamu pil panatik (gout medicine pil panatik)	Merremia mammosa	Gout	paracetamol Phenylbutazone	Health-problem	Fake BPOM/NADFC registered number
16	Pil ramuan shin she merah delima (supplement pill ramuan shin she merah delima)	Punica granatum	Supplement immunity	paracetamol, as mefenamat and diclofenac	Lifestyle	Fake BPOM/NADFC registered number
17	New anrat jamu tradisional jaya (gout medicine jamu jaya)	Zingiberis rhizome, Andrographidis folium, Kaemferia rhizome, Curcuma domestica rhizome, myristicae senen, Retrofracti fructus.	Gout	Methampyrone	Health-problem	Fake BPOM/NADFC registered number
18	Jamu as-syifa tumpas plus habbatussauda (supplement immunity as-syifa)	Nicela sativa linn.	Supplement immunity	Teofilin	Lifestyle	Fake BPOM/NADFC registered number
19	Jamu asam urat laga kuat tahan lama (gout medicine laga tahan lama)	Syzgium polyanthum.	Gout	Paracetamol	Health-problem	Fake BPOM/NADFC registered number
20	Jamu as-syifa izza chikungunya (diet pill as-syifa izza chikungunya)	Stichopis variegatus	Diet	Phenylbutazone and paracetamol	Lifestyle	Fake BPOM/NADFC registered number
21	Jamu as-syifa izza kecenthit (analgesic jamu as syifa izza kecenthit)	Orthosiphon aristatus, Cynum asiaticit)	Analgesic	Phenylbutazone and paracetamol	Health-problem	Fake BPOM/NADFC registered number
22	Acai berry kapsul lunak (diet soft capsule)	Euterpe Oleracea	Diet	Supplement Immunity	Lifestyle	-

Table 1. Cont.

23	Pegal linu asam urat akar dewa (analgesic and gout medicine akar dewa)	Gymia segethim/ Gynura pseduchina	Gout	Piroxicam	Health-problem	-
24	Pegal linu cap kuda laut (analgesic cap kuda laut)	Gyzqum aromalicum	Analgesic	Piroxicam	Health-problem	-
25	Jamu encok asam urat akar dewa rasa pahit (gout medicine dewa rasa pahit)	Gymia segethim/ Gynura pseduchina	Gout	Piroxicam	Health-problem	-
26	Gemuk sehat nafsu makan akar dewa (diet pill akar dewa)	Gynura divaricata	Diet	Supplement Immunity	Lifestyle	-
27	pegal linu asam urat akar dewa serbuk	Justicia gendarusa	Gout	Piroxicam and as mefenamat	Health-problem	-
28	Men li kapsul (sex medicine for men capsule)	Eurocoma longiforma	Sex medicine	Tadalafil	Lifestyle	-
29	Hwang di dong chong xia cao kapsul(sex medicine capsule hwang didong)	Golden cordyceps, Cordyceps sinensis, Asomycete fungi.	Sex medicine	Sildenafil citrate	Lifestyle	-

No	Counterfeit herbal medicine brand 2013		Traditionall y use for	Substitute medicine	Types of Health-problem	Type of tampering
1	Performa epidemium kapsul (erectile dysfunction performa epidemium)	Eurocoma longiforma	Erectile dysfunction (ED)	Tadalafil	Lifestyle	-
2	Saplingtan powder (analgesic powder)	Corn powder	Analgesic	paracetamol and Caffeine	Health-problem	No herbal medicines only corn powder
3	Asmur top (gout medicine asmur top)	Sesbaniae cortex ricinifolium, Moringae bubus, Zeniberis rhizome.	Gout	Paracetamol and Na diclofenac	Health-problem	Fake BPOM/NADFC registered number
4	Daun binahong kapsul (gout medicine capsule daun binahong)	Bassela tubra linn	Gout	Paracetamol, Phenylbutazone, Piroxicam	Health-problem	Fake BPOM/NADFC registered number
5	Lida slimming kapsul (diet pill for slimming capsule)	Guazumae ulmifolia Folium, Murrayae Paniculata Folium Morinda Citrifolia Fructus, Punicae Granati Cortex Curcumae,	Diet	Supplement sibutramine hydrochloride	Lifestyle	Fake BPOM/NADFC registered number
6	Jinten hitam kapsul (supplement capsule Jinten hitam)	Nigella sahiva	Supplement immunity	paracetamol	Health-problem	Fake BPOM/NADFC registered number
7	Pegal linu lalurat cap madu klanceng cairan obat dalam (gout medicine lalurat madu klanceng)	Propolis (honey klanceng)	Gout	Phenylbutazone	Health-problem	Fake BPOM/NADFC registered number
8	Asam urat jamur mas cairan obat dalam (gout medicine jamur mas cairan obat dalam)	Justicia gendarusa	Gout	Phenylbutazone and dexamethasone	Health-problem	Fake BPOM/NADFC registered number
9	Pegal linu lalurat cap madu klanceng cairan obat dalam (analgesic linu lalurat cap madu klanceng)	Propolis (honey klanceng)	Gout	Phenylbutazone and dexamethasone	Health-problem	Fake BPOM/NADFC registered number

Table 1. Cont.

10	Asam urat jamur mas cairan obat dalam (gout medicine jamur mas)	Justicia gendarusa	Gout	paracetamol and Phenylbutazone	Health-problem	Fake BPOM/NADFC registered number
11	Pegal linu cap madu kalnceng cairan obat dalam (analgesic cap jamu klanceng)	Justicia gendarusa	Analgesic	dexamethasone paracetamol and Piroxicam	Health-problem	Fake BPOM/NADFC registered number
12	Thingbao sari mahkota dewa kapsul (gout medicine Thingbao mahkota dewa)	Phaleria macrocarfa	Gout	paracetamol Phenylbutazone	Health-problem	Fake BPOM/NADFC registered number
13	Amuraten cairan obat dalam (gout medicine amuraten)	Justicia gendarosa	Gout	Dexamethasone, paracetamol and Piroxicam	Health-problem	Fake BPOM/NADFC registered number
14	Alma ramping ayu kapsul (diet pill alma ramping ayu capsule)	Camellia sinensis	Diet	Teofilin	Lifestyle	Fake BPOM/NADFC registered number
15	Shuyga kapsul (sex medicine capsule Shuyga)	Velvet bean	Erectile dysfunction	Sildenafil citrate and paracetamol	Lifestyle	Fake BPOM/NADFC registered number
16	Obat kuat tahan lama pusaka madu ekstra strong (sex medicine pusaka madu)	Asteracantha longifolia	Sex medicine	Sildenafil citrate and paracetamol	Lifestyle	Fake BPOM/NADFC registered number
17	Urat madu black kapsul (sex medicine capsule urat madu)	Asteracantha longifolia	Sex medicine	Sildenafil citrate and paracetamol	Lifestyle	Fake BPOM/NADFC registered number
18	Cantik langsing kapsul (diet capsule cantic langsing)	Yohimbe extract, tousat ali, zinsiber, rhizome, curcuma rhizoma	Diet	bisakodil	Lifestyle	-
19	Long hwa tibet tianxiong 100 mg tablet (sex medicine Long hwa Tibet tianxiong)	Garcinla mangostana	Sex medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number
20	Obat kuat tahan lama gali gali asli kapsul(erectile dysfunction medicine gali gali asli kapsul)	Fruit of Chinese wolfberry Chinese yam, senon cascade	Sex medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number
21	Africa black ant kapsul (erectile dysfunction medicine Africa black ant capsule)	Eurscoma longifoliajack	Erectile dysfunction	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number
22	One night 8 times kapsul (erectile dysfunction medicine One night 8 times capsule)	Black ant, formina sangainea panax ginseng, hippocampi course extra medlari	Erectile dysfunction	Sildenafil citrate	Lifestyle	-
23	Akar ginseng serbuk (supplement medicine powder akar ginseng)	Eurycoma longifolia jack	Supplement immunity	Paracetamol	Lifestyle	Fake BPOM/NADFC registered number
24	Kapsul istimewa gemuk sehat (diet capsule)	Cincuma zanthorrhizu curcimalunya, foeniculum vulgare miller	Diet	Dexamethasone	Lifestyle	Fake BPOM/NADFC registered number
25	Buah merah plus sea horse and ginseng (supplement buah merah)	Pandanus conoideus	Supplement immunity	Paracetamol	Lifestyle	Fake BPOM/NADFC registered number
26	Dewi pelangsing (diet pill Dewi pelangsing)	Curcuma zanthorriza Al pinia galangal Curcuma longa	Diet	Sibutramine hydrochloride and paracetamol	Lifestyle	Fake BPOM/NADFC registered number

Table 1. Cont.

27	Jamu tradisional jaya prima gemuk sehat (diet pill Tradisional jaya prima gemuk sehat)	Curcuma zaurthoriza Curcuma louga Foeniculum vulgae miler	Diet	paracetamol	Lifestyle	Fake BPOM/NADFC registered number
28	Pegal linu dan asam urat herbalin (analgesic and gout medicine herbalin)	Justicia gendarusa	Analgesic	paracetamol	Health-problem	Fake BPOM/NADFC registered number
29	Kopi rempah cap luwak cobra serbuk (sex medicine coffee powder rempah cap luak cobra)	Retrofracti fructus, zngiberis zerumbeti rhizoma	Sex medicine	Paracetamol and Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number
30	Tupai jantan kapsul(sex medicine Tupai jantan capsule)	Retrofracti fructus, zngiberis zerumbeti rhizoma	Sex medicine	paracetamol	Lifestyle	Fake BPOM/NADFC registered number
31	Buah naga merah kapsul (analgesic capsule buah naga)	Hylocereus undatus	Analgesic	Phenylbutazone	Health-problem	Fake BPOM/NADFC registered number
32	Jak-ban serbuk (sex medicine powder Jak-Ban)	Retrofracti fructus, zngiberis zerumbeti rhizoma	Sex medicine	Sildenafil citrate and Caffeine	Lifestyle	Fake BPOM/NADFC registered number
33	Zhui feng tan pil (gout pill zhui feng tan)	Phaleria macrocarfa	Gout	Dexamethasone	Health-problem	Fake BPOM/NADFC registered number
34	Zam zam kapsul (supplement capsule zam zam)	Yohimbe bark extract, retrofracti fructus	Supplement immunity	paracetamol	Lifestyle	Fake BPOM/NADFC registered number
35	Ramuan obat husada dewa merah (analgesic husada dewa merah)	Pandanus conoideus	Analgesic	paracetamol and Dexamethasone	Health-problem	Fake BPOM/NADFC registered number
36	Ekstrak kapsul sumber syariat cap kuda liar (sex medicine capsul sumbe syariat cap kuda liar)	Retrofracti fructus, zngiberis zerumbeti rhizoma	Sex medicine	paracetamol and Phenylbutazone	Health-problem	Fake BPOM/NADFC registered number
37	Jamu tradisional wali songo kapsul (supplement capsule wali songo)	Yohimbe bark extract, retrofracti fructus	Supplement immunity	paracetamol	Lifestyle	Fake BPOM/NADFC registered number
38	Sesak nafas batuk asma serbuk (asthma relieve medicine and cough powder)	Kaempferia galaga rhizome, Curcuma xanthoriza rhizome, Amomum cardam omum, Zingiber officinale var rubrum rhizome, Centella asiatica herba	Cough	Teofilin	Health-problem	Fake BPOM/NADFC registered number
39	Guar gum supplement serat tinggi (supplement capsule guar guam)	Zingiberis rhizome, retrafracti fructus, theaeifolium.	Supplement immunity	Sibutramin HCL	Lifestyle	-
40	Urat kuda kapsul (erectile dysfunction medicine urat kuda)	Retrofracti fructus, zingiberis zerumbeti rhizoma	Sex medicine	Sildenafil citrate, paracetamol and Caffeine	Lifestyle	Fake BPOM/NADFC registered number
41	Sari pinang serbuk (analgesic powder sari pinang)	Orthosiphosis folia, zingiberis zerumbeti rhizome.	Analgesic	Natrium Diclofenac	Health-problem	Fake BPOM/NADFC registered number
42	Kapsul istimewa gemuk sehat (diet pill gemuk sehat)	Semen cusculae, Fructus crataegus, Fructus herdel germinates, radix astragali, Rhizoma atractylodis mak.	Diet	Paracetamol	Lifestyle	Fake BPOM/NADFC registered number

Table 1. Cont.

43	Surya java kapsul (diet capsule surya java)	Curcuma zaurthoriza Curcuma louga Foeniculum vulgae miler.	Diet	Paracetamol	Lifestyle	Fake BPOM/NADFC registered number
44	Urat dewa kapsul (sex medicine urat dewa)	Phaleria macrocarpa.	Sex medicine	Sildenafil citrate and Caffeine	Lifestyle	Fake BPOM/NADFC registered number
45	Tawon liar kapsul (analgesic capsule tawon liar)	Vespula vulgaris.	Analgesic	paracetamol and Caffeine	Health-problem	Fake BPOM/NADFC registered number
46	Honeymoon serbuk (sex medicine honeymoon)	Ginseng radix, Eurycomae radix, Kaemferiae rhizoma.	Sex medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number
47	Berkah husada pegal linu serbuk (analgesic berkah husada)	Orthosiphosis folia, zingiberis zerumbeti rhizome.	Analgesic	Phenylbutazone and paracetamol	Health-problem	Fake BPOM/NADFC registered number
48	Jamu jawa dwipa cap tawon klenceng cairan obat dalam (gout medicine jawa dwipa cap tawon)	Vespula vulgaris klanceng	Gout	Phenylbutazone	Health-problem	Fake BPOM/NADFC registered number
49	Jamu tradisional asam urat madu klanceng tablet (gout medicine madu klanceng tablet)	Vespula vulgaris klanceng	Gout	Phenylbutazone	Health-problem	Fake BPOM/NADFC registered number
50	Jamu tradisional asam urat cap madu klanceng sirup (gout medicine madu klanceng syrup)	Vespula vulgaris klanceng	Gout	Phenylbutazone	Health-problem	Fake BPOM/NADFC registered number
51	Obat herbal pegal linu dan asam urat madu twin klanceng (gout medicine madu twin kanceng)	Vespula vulgaris klanceng	Gout	Phenylbutazone	Health-problem	Fake BPOM/NADFC registered number
52	Pegal linu mahkota dewa (analgesic mahkota dewa)	Phaleria macrocarpa	Analgesic	Phenylbutazone	Health-problem	Fake BPOM/NADFC registered number
53	Jamu gali gali (sex medicine gali gali)	Ginseng radix, Eurycomae radix, Kaemferiae rhizoma	Sex medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number
54	Jamu mat kwat (sex medicine gali gali)	Ginseng radix, Eurycomae radix, Kaemferiae rhizoma	Sex medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number

No	Counterfeit herbal medicine in 2014		For therapy	Substitute medicines	Type of Health-problem	Types of Fraud
1	Jamu Rheumaton cair cap burung dua sayap (sex medicine rheumaton cair cap burung)	Arecha catechu L, Zingiber officinale.	Sex Medicine	Phenylbutazone	Lifestyle	-
2	Kioe kiet bang eng san (sex medicine kioe kiet)	Peuraria tuberosa, Panax ginseng	Sex Medicine	Sulfamethoxazole	Lifestyle	-
3	Raga prima cap payung (supplement raga prima)	Yohimbe bark extract, Retrofracti fructus.	Supplement imun	Dexamethasone	Lifestyle	-
4	Herbal plus kapsul (sex medicine capsule herbal plus)	Ginseng radix, Eurycomae extract, Zingiberis rhizome extract.	Sex Medicine	Supplement sibutramine Supplement imun dan tadalafil	Lifestyle	-

Table 1. Cont.

5	Herbal pria asli (sex medicine herbal pria asli)	Ginseng radix, Eurycomae extract, Zingiberis rhizome extract.	Sex Medicine	Supplement imunldenafil Supplement imunrat	Lifestyle	-
6	Sehat pria serbuk (sex medicine powder sehat pria)	Ginseng radix, Eurycomae extract, Zingiberis rhizome extract.	Sex Medicine	Sildenafil citrate	Lifestyle	-
7	Antoyo kunci mas (analgesic Antoyo kunci mas)	Languatis rhizome, Melaleuca fructus.	Analgesic	Phenylbutazone, dexamethasone dan paracetamol	Health-problem	-
8	Kapsul diabetes 919 (diabetic capsule 919)	Morinda citrifolia, Andrographis panielata.	Diabetic	Glibenklamid	Health-problem	-
9	kapsul asam urat uricacide (gout capsul uricacid)	Justicia gendarusa	Gout	Antalgin	Health-problem	-
10	Magix secs kapsul (sex medicine capsule secs)	Ginseng radix, Eurycomae extract, Zingiberis rhizome extract.	Sex Medicine	Sildenafil citrate and paracetamol	Lifestyle	Fake BPOM/NADFC registered number
11	Bima sakti obat kuat tahan lama kapsul (sex medicine capsule bima sakti)	Ginseng radix, Eurycomae extract, Zingiberis rhizome extract.	Sex Medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number
12	Daun tapak liman kapsul (sex medicine daun tapak liman)	Elephantopus scaber.	Sex Medicine	paracetamol	Health-problem	Fake BPOM/NADFC registered number
13	Bugarin kaplet (Sex medicine caplet bugarin)	Ginseng radix, Eurycomae extract, Zingiberis rhizome extract.	Sex Medicine	paracetamol	Health-problem	Fake BPOM/NADFC registered number
14	Puyer obat kuat tahan lama bali bali on (Sex medicine bali bali)	Ginseng radix, Eurycomae extract, Zingiberis rhizome extract.	Sex Medicine	Sildenafil citrate and paracetamol	Lifestyle	Fake BPOM/NADFC registered number
15	Supplement singset alami kapsul (Supplement and diet pill singset alami)	Saropi folium, zingiberis zerumbes rhizome, curcumae rhizome, Elephantopi folium.	Diet	paracetamol	Health-problem	Fake BPOM/NADFC registered number
16	Sehat langsing kapsul (diet pill capsule)	Elephantopi folium.	Diet	piridokSuppleme nt immun	Lifestyle	Fake BPOM/NADFC registered number
17	Gatal gatal dan alergi kulit kapsul (anti pruritus and allergy capsule)		Skin	paracetamol	Health-problem	Fake BPOM/NADFC registered number
18	Habbatussaudahh kapsul (supplement capsule habbatusaudah)	Nigella sativa L	Supplement immunity	paracetamol and Phenylbutazone	Lifestyle	Fake BPOM/NADFC registered number
19	Daun dewa kapsul (ancer medicine capsule daun dewa)	Phaleria macrocarpa	Cancer	paracetamol	Health-problem	Fake BPOM/NADFC registered number
20	Sehat badan (analgesic sehat badan)	Languatis rhizome, Melaleuca fructus	Analgesic	paracetamol	Health-problem	Fake BPOM/NADFC registered number
21	Obat kuat dan tahan lama dracula xtra strong serbuk (sex medicine powder xtra strong)	Ginseng radix, Eurycomae extract, Zingiberis rhizome extract.	Sex Medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number
22	Urat kuda ginseng dan sanrego serbuk (sex medicine kuda ginseng)	Ginseng radix, Eurycomae extract, Zingiberis rhizome extract.	Sex Medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number

Table 1. Cont.

23	Jamu tradisional jantan pria liceng swie madu klanceng (sex medicine jantan pria liceng swie)	Ginseng radix, Eurycomae extract, Zingiberis rhizome extract.	Sex Medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number
24	Langsing kapsul (diet capsule)	Curcuma zanthorriza Al pinia galangal Curcuma longa	Diet	Supplement imunbutramine hydrochloride	Lifestyle	Fake BPOM/NADFC registered number
25	chong cao huozao beimu zhike kapsul(lung medicinecapsule cao huozao beimu zhike)	Cordyceps (Ascomycetes fungi)	Paru paru	chlorpheniramine maleate, dexamethasone, prednisone, natrium diklofenak dan caffeine	Health-problem	Fake BPOM/NADFC registered number
26	kopi rempah grenk(sex medicine coffee rempah grenk)	Civet coffee	Sex Medicine	Sildenafil citrate and paracetamol	Lifestyle	Fake BPOM/NADFC registered number
27	Shen ling asam urat pegal linu serbuk (gout medicine powder Shen Ling)	Phaleria macrocarfa	Gout	Piroxicam	Health-problem	Fake BPOM/NADFC registered number
28	Sehat langsug (diet pill)	Curcuma zanthorriza Al pinia galangal Curcuma longa	Diet	Sibutramine hydrochloride	Lifestyle	Fake BPOM/NADFC registered number
29	Cobra sakti kapsul (sex medicine cobra sakti)	Ginseng radix, Eurycomae extract, Zingiberis rhizome extract.	Sex Medicine	Chlorpheniramine maleate and Caffeine	Lifestyle	Fake BPOM/NADFC registered number
30	Jamu tradisional kuda liar kapsul (traditional kuda liar capsule)	Ginseng radix, Eurycomae extract, Zingiberis rhizome extract.	Sex Medicine	paracetamol	Lifestyle	Fake BPOM/NADFC registered number
31	Assalam kapsul (Gout medicine assalam)	Centella asiatica, Gloriosa superbae, mimosa pudical, Phylannus urinarialin, Soncus arvesisi.	Gout	paracetamol and Natrium Diclofenac	Health-problem	Fake BPOM/NADFC registered number
32	Kelenceng putih cairan obat dalam (sex medicine syrup kelenceng putih)	Trigonna spp	Sex Medicine	Phenylbutazone	Lifestyle	Fake BPOM/NADFC registered number
33	Sehat perkasa goro goro serbuk (sex medicine goro goro serbuk)	Ginseng radix extract, Eurycomae radix, Kaemterial rhizome extract.	Sex Medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number
34	Jamu sura madu cairan obat dalam (sex medicine syrup sura madu)	Panax ginseng, hypocampus tribulus testiteris, cornifrutus, Ganoderma, Damiana, Muira puama.	Sex Medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number
35	Than niao pao cap semut (diabetic drug Than niao pao cap semut)	Tinosporal cautis, Andrographi dishorba, curcuma rhizome, syziggi semen.	Diabetic drugs	Glibenkamin and caffeine	Health-problem	Fake BPOM/NADFC registered number
36	xiaokewan diabepil (diabetic pill xiaokewan)	Tinosporal cautis, Andrographi dishorba, curcuma rhizome, syziggi semen.	Diabetic drugs	Glibenkamin	Health-problem	Fake BPOM/NADFC registered number

Table 1. Cont.

37	xtra kuat kapsul (sex medicine capsule xtra kuat)	Ginseng radix extract, Eurycomae radix, Kaemterial rhizome extract.	Sex Medicine	Supplement sildenafil citrate and paracetamol	Lifestyle	Fake BPOM/NADFC registered number
38	chufong taokuwar sakit kepala (analgesic chufong taokuwar)	Syzygium aromaticum	Analgesic	Asam mefenamat	Health-problem	Fake BPOM/NADFC registered number
39	Jang-serbuk (sex medicine powder jang)	Ginseng radix extract, Eurycomae radix, Kaemterial rhizome extract.	Sex Medicine	Sildenafil citrate and paracetamol	Lifestyle	Fake BPOM/NADFC registered number
40	Cobra sakti kapsul (sex medicine capsule cobra sakti)	Ginseng radix extract, Eurycomae radix, Kaemterial rhizome extract.	Sex Medicine	Chlorpheniramine maleate and Caffeine	Lifestyle	Fake BPOM/NADFC registered number
41	Tou gubao kapsul (anti rheumatic capsul tou gubao)	Orthophois folia, zingiberis zerumbeti rhizome extract.	Anti reumatic	Dexamethasone	Health-problem	Fake BPOM/NADFC registered number
42	Pusaka 9 dewa serbuk(analgesic powder pusaka 9 dewa)	Curcumaerhizoma, Eucaliptus fructus, Retrofracti frustus.	Analgesic	Phenylbutazone and paracetamol	Health-problem	Fake BPOM/NADFC registered number
43	Sari manggis kapsul (Supplement immunity capsule sari manggis)	Garcia mangostana.	Supplement immunity	Phenylbutazone and paracetamol	Lifestyle	Fake BPOM/NADFC registered number
44	You jiang tang tablet (diabetic drug tablet you jiang tang)	Rheumanae radix, coptidis rhizome, lyvi fructus.	Diabetic	Glibenklamid	Health-problem	Fake BPOM/NADFC registered number
45	Naiao suan wan kapsul (gout capsule Naioa suan wan)	Ganoderma lucidium, Zea mays, Cortex cinnamomi, Paeonia suffruticosa.	Gout	Dexamethasone, prednisone, Chlorpheniramine maleate and Caffeine	Health-problem	Fake BPOM/NADFC registered number
46	Ramurat obat herbal sam urat (gout medicine samurat)	Orthosiphons folia, Zingiberis zerumbeti, Zingiberis rhizome.	Gout	Paracetamol	Health-problem	Fake BPOM/NADFC registered number
47	Sari buah naga kasul (gout medicine capsule sari buah naga)	Hylocerus undatus	Gout	Paracetamol	Health-problem	Fake BPOM/NADFC registered number
48	Jamu sehat pria kelabang raja (sex medicine kelabang raja)	Murcuna pruriens	Sex Medicine	Sildenafil citrate	Lifestyle	-
49	X-tra dahsyat obat kuat tahan lama (sex medicine X-tra dahsyat)	Murcuna pruriens	Sex Medicine	Sildenafil citrate	Lifestyle	Fake BPOM/NADFC registered number
50	Asam urat dan pegal linu mahkota dewa serbuk (gout medicine powder mahkota dewa)	Phaleria macrocarpa	Gout	Paracetamol	Health-problem	Fake BPOM/NADFC registered number
51	Xian ling kapsul (gout medicine capsule Xian ling)	Dispaci radix, puerariae radix, Glechoma herba, Angelicae sinensis radix, Clematidus radix.	Gout	Piroxicam	Health-problem	Fake BPOM/NADFC registered number

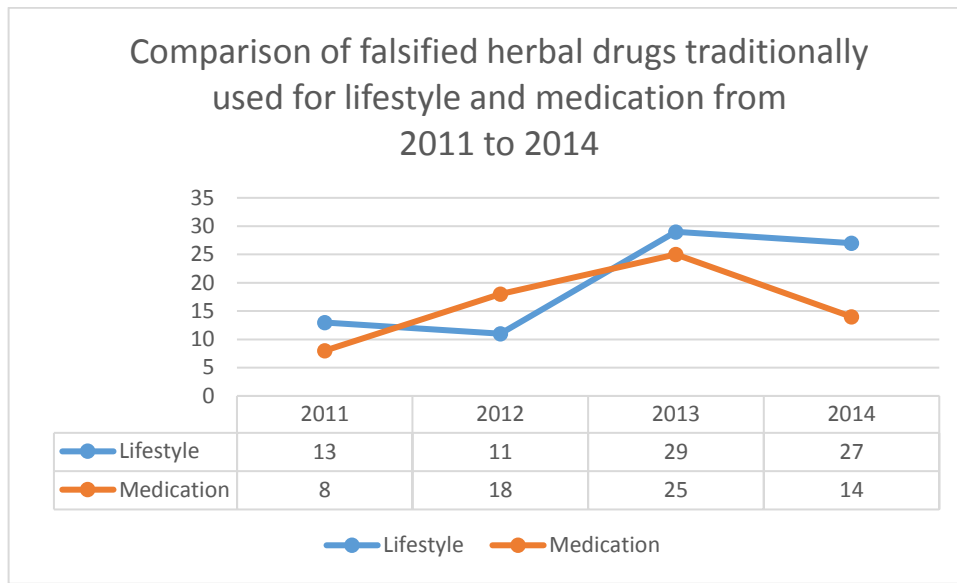


Figure 1. comparison of counterfeit herbal medicines factory claims used for lifestyle and medication from 2011 to 2014.

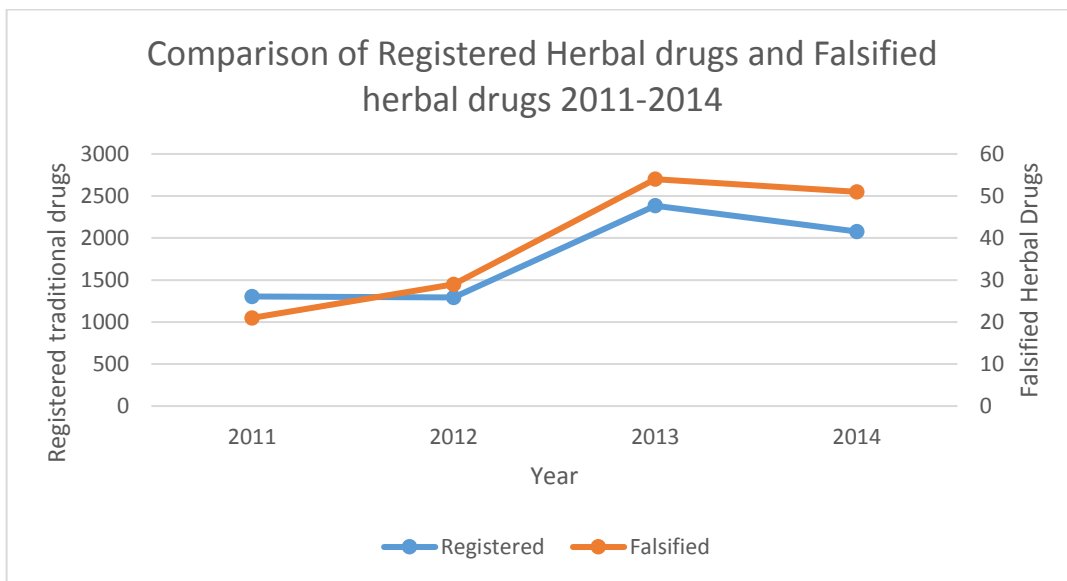


Figure 2. Comparison of registered herbal drugs and counterfeit herbal drugs year 2011 to 2014

medicines that were used as substitutes for the falsified herbal drug (adulterants), and type of each tampering case as well as botanical name of active ingredients. Then, the author categorized the falsified herbal drugs claims into the following two classes: lifestyle drugs or drugs used to cure health problems of the consumer (Figure 1).

Furthermore, a stacked line chart was used to present general trends of falsified herbal drugs from 2011 to 2014 and to describe the comparison between the registered herbal drug trend and falsified herbal drug trend during selected years (Figure 2).

In addition, I analyzed the registered herbal medicines from 2011 to 2014 based on the factory's claims of traditional use (Table 2).

RESULTS

From 2011 to 2014, the amount of falsified medicines and the variety of substitute chemical/conventional medicines increased. Examples of substituted chemical medicines include sildenafil citrate, piroxicam, paracetamol, phenylbutazone, tadalafil, metamphirone, natrium diclofenac, prednisone, mefenamic acid, sibutramine

Table 2. List of factory claims for the traditional used registered *jamu*.

Traditionally use for	Numbers of herbal medicines brand			
	2011	2012	2013	2014
Alimentary tract and metabolism	125	159	285	251
Blood and blood forming organs	24	30	48	41
Cardiovascular system	114	63	108	106
Dermatological and hair	69	52	106	109
Genital Urinary system and sex hormones, breast and kidney	152	174	484	329
Anti-neoplasia immunomodulation agents	277	359	661	613
Metabolic/endocrine system	66	71	113	70
Analgesic, antipyretic, anti-inflammation, gout	143	97	165	161
Nervous system	17	19	35	34
Infection	49	6	10	9
Respiratory system	80	59	72	81
Eyes and ears	11	4	8	9
Supplement for kids	36	20	56	41
Mouth	9	2	27	14
Total	1303	1293	2384	2076

hydrochloride, bisakodil, dexamethasone, theophylline, cyproheptadine hydrochloride, antalgine, and glibenclamine. In addition, combinations of these substituted chemical medicines were used in herbal medicines. In 2011, the BPOM issued a public warning against the 21 brands of herbal medicine that were mixed with chemical drugs. This number increased to 28 brands in 2012 and approximately doubled in 2013 and 2014 (54 and 51 brands, respectively).

More counterfeit herbal drugs that claimed to be traditionally used for lifestyle use are noted compared with counterfeit herbal medicines that claimed to be traditionally used for medication, with the exception of 2012, which exhibited the opposite trend.

A slight decrease in the numbers of counterfeit herbal medicines used for lifestyle and medication use was observed for 2014 compared with 2013. As noted in the (Figure 2), the overall trends of counterfeit herbal medicines are consistent with registered herbal medicines. From 2011 to 2014, only 2% of falsified herbal drugs are comparable to registered herbal drugs.

The amount of substitute chemical medicines also increased during the four-year selected period (Table 1). In 2011, only 8 types of chemical/conventional medicines were herbal drug substitutes. In 2012, 2013 and 2014, the counterfeiter combined chemical medicines to create substitute herbal medicines, i.e., paracetamol combined with natrium diclofenac and paracetamol combined with phenylbutazone and methampyrone.

From 2011 to 2014, the most significant conventional medicine substitute in herbal medicine was paracetamol, which was used in combination with other conventional medicines or alone. Paracetamol accounted for over one-third of all types of conventional medicinal substitutes. Sildenafil citrate is the second largest substitute for conventional medicines (13%), and a large proportion of

drugs accounted for the remaining substitute medicines (59%).

All types of falsified herbal drug fraud involve adulteration. For several drugs, the counterfeiter commits fraud against consumers by using a deceptive registration number (Table 1).

In terms of herbal medicines factories claiming of traditional used, the highest numbers of brands are claims to be traditionally use for anti-neoplasia, immune modulation agents, whereas the small amount of them are claims traditionally use for mouth disease (Table 2).

DISCUSSION

The most obvious risk of counterfeit herbal drugs involves a patient's health. Unavoidable social effects, such as the loss of herbal drug consumers' trust, and economical losses from buying bogus drugs are also noted.

In Indonesia, an increasing number of people take a more proactive approach to their own health to seek out different forms of self-care. Numerous individuals in Indonesia turn to traditional and herbal products and practices based on the assumption that natural means safe, which is not necessarily true (Ekor, 2013).

However, there are also many advantages of using herbal medicines. For example, these medicines are typically accessible and affordable. In addition, these medicines are culturally acceptable and trusted by a large number of people.

In Indonesia, herbal medicines are categorized into three classes: registered *jamu*, standardized herbal and *fitofarmaka*. All of these classes have health benefits given their long empirical experience and health knowledge passed from generation to generation (WHO, 2009).

The differences among registered *jamu*, standardized herbal and *fitofar maka* are noted from supporting data regarding drug benefits, which are based on empirical data, preclinical data, or clinical data. Only six out of thousands of standardized herbal medicines have been classified as *fitofarmaka*. Thus, less than 2 percent of these herbal medicines have been subject to empirical efficacy clinical trials in humans, which involve significant costs and long trial periods (WHO, 2009; Dewoto, 2007). Registered *jamu* have been guaranteed by the Agency for Food and Drug Administration RI (BPOM) for their safety, efficacy and quality, there are many requirements for one *jamu* brand to be registered *jamu*. These agents must pass the BPOM assessment that includes criteria such as proven safe according to the state rule, claims of efficacy based on empirical data, meeting the applicable quality statement, and having efficacy claims that must use words such as "traditionally use for..." according for registration approval (Registration approval RI, 2012). Additionally, registered *jamu* marketing authorization was given to herbal drugs that use materials that meet the necessary requirements and quality. Moreover, *jamu* must be made by applying CPOTB (health standard for traditional medicines) as described in Law number 23 year 1992(NADFC/BPOM, 2015). In the National Health System for the Republic of Indonesia, the Ministry of Health Regulation no 246 year 1990 requires operation licenses and the registration of traditional medicines. In addition, the Ministry of Health decision RI no 659 year 1991 focuses on manufacturing procedures associate with traditional medicines (BPOM/NAFDC,2005). Other requirements for *jamu* marketing authorization include meeting the requirements of herbal pharmacopeia for Indonesia or other necessary requirements. In addition, the medicinal efficacy must be demonstrated by empirical data gathered from generation to generation, and the efficacy must be proven scientifically. Finally, to obtain marketing authorization, traditional drugs must also have complete information marketing that is not misleading (Ministry of Health RI, 2012).

Based on these data, almost all types of fraud regarding falsified herbal drugs in Indonesia from 2011 to 2014 involve adulteration (herbal drugs were substituted with conventional medicines to deceive the consumer by the fast action of these conventional medicines). These phenomenon was not consistent with the general thought in that the mixing of herbal drugs with conventional medicines would result in increased production costs. Substandard herbal medicines were achieved using low-cost production. Thousands of bogus pills were produced, and huge profits resulted from sales. Other types of fraud also included tampering or consumer deception through the use of fake NADFC/BPOM registration numbers (BPOM/NAFDC, 2015).

Adulterated herbal medicines in Indonesia are associated with numerous risks, such as being of poor quality, claiming unreliable product information, and having the

possibility of side effects or unwanted treatment interaction due to adulteration herbal medicines. Paracetamol and other substitutes using conventional medicines for herbal medicines might have different effects because numerous publications have shown that herbal medicines mixed with conventional medicines will have serious implications, including death.

Although the data from 2011 to 2014 indicate that less than 60 brands of counterfeit herbal medicines were seized, these data suggest that hundreds or even thousands of bogus pills reach the consumer. In 2015, the owners of counterfeit *jamu* were captured in all over Java. BPOM confiscated thousands of *jamu* pills and illegal medicines worth forty-eight billion Rupiah (USD 3,737,462.) (NAFDC/BPOM, 2015). In 2015, up to 865 unregistered packages of *jamu*, 708 bogus *jamu* pills and 8397 units of counterfeit medicines were dismantled by the drug taskforce police in the Cirebon region (Kriminal, 2015). This information was obtained based on information receipts from the neighborhood about suspicious drugs marketing activities, and the perpetrator claimed to have sold illegal drugs since 2010.

Several counterfeit cases have been seized; however, the truly severe results of consumer staking falsified herbal medicines remains unknown because people are still not aware of the counterfeit medicine issue in general.

For these reasons, NADFC/BPOM guarantees the quality of registered medicines before and after they go to the market by continuing their oversight of herbal medicine marketing and use in the community by conducting pre- and post-market supervision.

The NADFC issues and monitors the national drug code for herbal registered drugs required on all drug packaging through the use of a registration number (NADFC/BPOM Registration number).

CONCLUSIONS AND RECOMMENDATIONS

Falsified herbal drugs include both lifestyle and health-related drugs, and the number of falsified drugs are increasing. Drug adulteration and tampering are both involved in the type of fraud and obviously have serious adverse individual and community health effects. Taking falsified herbal drugs, especially medicines that factories claim are traditionally used for medication, can lead to sick patients who think they are under-treating their condition until it is too late. Substituting conventional medicines for herbal drugs can lead to toxic effects, including death. The existence of falsified herbal drugs has effects at the population level. In addition, patients lose trust of herbal medicines, and economic losses are directly noted.

The resurgence of public interest in herbal drugs has occurred due to various claims of efficacy for plant medicines and the authority for continuous control of the

herbal drug distribution in Indonesia. Manufacturers also have incentives to achieve the *fitofarmaka* level.

The counterfeiter should be subject to severe punishment as a deterrent. In addition, the public awareness should be increased regarding the fact that not all herbal remedies are zero risk and dangerous effects could occur if herbal drugs are deliberately combined with other drugs. Regarding the consumer selection of herbal drugs, the authorities should inform the public about the different types of herbal medicines, such as registered herbal drugs, standardized herbal drugs or *fitofarmaka* herbal drugs.

Finally, it is expected that people in Indonesia should check their herbal drugs on the official NADFC/BPOM website to make sure that the herbal drugs they consume are considered safe under the RI health law rules via the NADFC/BPOM registration process.

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Declaration of Conflicting Interests

The author have no conflicts of interest to declare.

REFERENCES

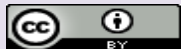
- Aditama TY (2015). Kementrian Kesehatan Republic Indonesia; Jamu dan kesehatan 2nd ed. Indonesia, pp 5-12.
- World Health Organization. (2014). Quality traditional medicine can deliver Universal Health Coverage. SEAR/PR/1584.
- World Health Organization. (2005). Traditional Medicine Strategy 2002-2005.
- Tilbur JC, Kaptchuk TJ. (2008). Herbal Medicine Research and Global Health: an ethical analysis. Bull World Health Organization; 86 (8); 594- 599.
- RISKESDAS (Basic health research). (2010). Report book Balitbang (Agency for Health Research and Development of Health Republic of Indonesia). Catalogue 18.
- Indonesia National Agency of Drugs and Food Control (NADFC/BPOM). (2012). Check products. BPOM official website.
- Health Law RI. (1992). Undang-undang Republik Indonesia no 23 tahun 1992. Tentang kesehatan. Ministry of Health Republic of Indonesia official website.
- Indonesia National Agency of Drugs and Food Control (NADFC/BPOM). (2014). Fungsi badan pengawas obat dan makanan. Press release.
- International Medical Product Anti-Counterfeiting (IMPACT). (2009). Counterfeit drugs kills!. Impact Brochure, pp 4.
- International Criminal Police Organization (INTERPOL). (2014). Pharmaceutical crimes, operations. INTERPOL Official website.
- Indonesia National Agency of Drugs and Food Control (NADFC/BPOM). (2015). Pemberantasan peredaran obat ilegal yang dipasarkan secara online melalui operasi Pangea VIII. Official BPOM website.
- Indonesia National Agency and Food Control (NADFC/BPOM). (2005). Operasi Pangea VIII sita 27.6 Miliar Rupiah produk ilegal termasuk palsu di Indonesia. Official BPOM website.
- Ekor M. (2013). The growing use of herbal medicines : issues relating to adverse reactions and challenges in monitoring safety. Front Pharmacol. 4 : 177.
- World Health Organization. (2009). Growing threat from counterfeit medicines. Bulletin WHO. 88(4).
- Dewoto HR. (2013). Pengembangan Obat tradisional Indonesia menjadi fitofarmaka. Majalah Kesehatan Indonesia. 57 (7): 205-2011.
- Registration approval Ministry of Health Republic of Indonesia. (2012). Peraturan Menteri kesehatan Republik Indonesia no 006/2012 tentang industry dan usaha obat tradisional. Ministry of Health Official website.
- Indonesia National Agency and Food Control (NADFC/BPOM). (2014). Keputusan Kepala BPOM no HK.00.05.4.2411. tentang ketentuan pokok pengelompokan dan penandaan obat bahan alami Indonesia. NADFC/BPOM Official web site.
- Indonesia National Agency and Food Control (NADFC/BPOM). (2005). Peraturan kepala BPOM tentang kriteria dan tata laksana daftaran obat tradisional, obat herbal terstandar dan fitofarmaka. BPOM/NADFC official website.
- Ministry of Health Republic of Indonesia (MoH RI). (2012). Peraturan menteri kesehatan Republik Indonesia no 007 tahun 2012 tentang registrasi obat tradisional. Moh RI Official website.
- Indonesia National Agency and Food Control (NADFC/BPOM). (2015). Laporan kinerja. Report to the Nation tahun 2015. BPOM Official website.

Indonesia National Agency and Food Control (NADFC/BPOM). (2015). Operation Storm VII. BPOM/NADFC Official website.

Kriminal. (2015). Satgas polres Cirebon ungkap ribuan penjual jamu ilegal. Radio Republic Indonesia official website.

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