ABSTRACT
Herbal medicine has been used empirically worldwide including in Indonesia but is not recorded properly yet. This analysis aimed to obtain the herbal medicine service patterns especially the combination of treatments, amount and types of herbal preparation. Jamu Registry was an observational study on electronic medical recording of herbal medicine services by medical doctor on 10 health problems in several cities of Indonesia. A total of 54 medical doctors participated in Jamu Registry 2016 and 2018 recorded 1660 visits of 565 patients aged 10 to 85 years old (mean 49.8), treated with herbal medicine. More than half patients (68.1%) were diagnosed with single diagnosis, 24.4% with one comorbidity, and 7.4% with two comorbidities. Most patients (70.4%) were treated with herbal medicine only, while others combined with conventional medicine (22.0%), other traditional modalities (4.6%), conventional medicine and other traditional medicine (3.0%). Numbers of herbal medicine prescribed were varied from one to five. The herbal preparation types were extracts in capsule (38.6%), infusion (31.5%), ground dried herbs in capsule (25.8%), and the others were decoction, syrup, fermentation liquid, ground dried herbs, or brewed herbs. The top 5 diagnoses recorded were dyspepsia, diabetes mellitus, hypertension, hemorrhoid, and arthritis. Almost three quarters patients had no comorbidity; most patients were treated with herbal only, mostly in form of capsule and infusion. Herbal medicine services need to be recorded continuously to enrich the traditional medicine health services data.

Keywords: service pattern, herbal medicine, medical doctor, Jamu registry
circumstances) known or suspected to cause adverse health effects [9]. This analysis aimed to obtain the herbal medicine services patterns especially the combination of treatments, amount and types of herbal preparation from Jamu Registry dataset in 2016 and 2018.

2. METHOD

Jamu Registry was an observational study on electronic medical recording of herbal medicine service by medical doctor. Medical doctors participated in Jamu Registry doing practice in 25 regencies/cities in Java, 2 regencies/cities in Bali, one city in South Sumatra, one city in East Kalimantan, and one city in Jambi. All medical doctors participated had practice license. Mostly the doctors had attended 50 hours Jamu Scientification training and workshop organized by Ministry of Health. They treated patient following the standard of services, no intervention from researchers, then input the patients’ medical record into Jamu Registry website coordinated by NIHRD at https://www.ina-registry.org. Ten diagnoses recorded were dyspepsia, diabetes mellitus, hypertension, hemorrhoids, arthritis, cancer/tumor, hypercholesterolemia, obesity, hyperuricemia, and liver dysfunction with at least 2 consecutive visits of the same diagnosis. Jamu Registry differs from conventional medical records in its detail on herbal medicine usage and patients’ quality of life. Data analyzed were extracted from Jamu Registry 2016 and 2018 database which had been approved by Research Ethical Committee of NIHRD with number LB.02.01/5.2/KE 412/2016 and LB.02.01/2/KE 119/2018. Data was analyzed in distribution frequency to provide herbal medicine service pattern.

3. RESULTS AND DISCUSSION

A total of 54 medical doctors participated in Jamu Registry 2016 and 2018 recorded 1660 visits of 565 patients aged 10 to 85 years old (mean 49.8), 227 males and 338 females, treated with herbal medicine. Patients treated were mostly adults with more females than males. This is quite similar with the characteristic of patients consulted to Chinese medicine practitioners (CMPs) in primary care in Hong Kong. A total of 398 patients (70.4 %), ranged from 60.3% in hemorrhoid patients to 88.6 % in obesity patients, were treated with herbal only. Patients with comorbidity are more likely to be treated with combination of conventional medicine or other traditional modalities such as acupuncture, massage, acupressure, aurasin, or cupping. Analysis on national health insurance research database in Taiwan for hepatitis C virus infection from 2000 to 2010 showed that herbal remedies (52.4%) were the most commonly used agents, followed by combination therapy/herbal plus acupuncture (46.4%), and acupuncture alone (1.2%) [11]. In previous study on 108 conventional doctors who did herbal medicine practice showed that 88.9% of them prescribed herbal medicine as complement to conventional medicine but 79.6% of them also prescribed herbal medicine as alternative medicine, which were mostly come with chronic disease and 30% of them had hypertension or diabetes mellitus [10]. More than half patients (68.1%) were diagnosed with single diagnosis, 24.4% with one comorbidity, and 7.4% with two comorbidities. The comorbidities are mostly one of the 10 diagnosis (diabetes mellitus, hypertension, hypercholesterolemia) and other diagnosis such as common cold, stroke, nephrolithiasis, asthma, and so on. About 49.7% patients were served in clinics, 29.9% in private practices, 18.8% in primary health centers, and 1.6% in hospitals. Only 56.8% patients came in third visit and 37.0% in fourth visit of the same period of illness.

Data collected were 90 patients with dyspepsia, 76 diabetes mellitus, 74 hypertension, 73 hemorrhoids, 63 arthritis, 60 cancer/tumor, 51 hypercholesterolemia, 35 obesity, 33 hyperuricemia, and 10 liver dysfunction. Most patients (70.4%) were treated with herbal only while others combined with conventional medicine (22.0%), other traditional modalities (4.6%), conventional medicine and other traditional medicine (3.0%) (Table 1).

Table 1. Patterns of herbal combination with conventional and other traditional modalities for 10 diagnoses in 565 patients at first visit

| Diagnosis               | Patients with herbal only | Patients with herbal + conventional | Patients with herbal + traditional | Patients with herbal + other traditional | Total |
|-------------------------|---------------------------|-------------------------------------|-----------------------------------|-----------------------------------------|-------|
| N                       | %                         | %                                   | %                                 | %                                       |       |
| Dyspepsia               | 46                        | 11                                  | 3                                 | 9                                       | 100   |
| No comorbidity          | 13                        | 79.9                               | 11.4                              | 5                                       | 100   |
| One comorbidity         | 15                        | 88.4                               | 11.5                              | 5                                       | 100   |
| Two comorbidity         | 2                          | 66.7                               | 11.1                              | 5                                       | 100   |
| Charcot's disease       | 30                        | 75.6                               | 14.4                              | 5                                       | 100   |
| No comorbidity          | 34                        | 75.6                               | 14.4                              | 5                                       | 100   |
| One comorbidity         | 11                        | 10.0                               | 71.1                              | 5                                       | 100   |
| Two comorbidity         | 5                         | 11.8                               | 22.2                              | 5                                       | 100   |
| Hypertension            | 53                        | 75.6                               | 14.4                              | 5                                       | 100   |
| No comorbidity          | 30                        | 75.6                               | 14.4                              | 5                                       | 100   |
| One comorbidity         | 10                        | 89.2                               | 18.0                              | 5                                       | 100   |
| Two comorbidity         | 5                         | 11.8                               | 22.2                              | 5                                       | 100   |
| Hemorrhoids             | 44                        | 75.6                               | 14.4                              | 5                                       | 100   |
| No comorbidity          | 39                        | 90.0                               | 11.0                              | 5                                       | 100   |
| One comorbidity         | 5                         | 11.3                               | 60.0                              | 5                                       | 100   |
| Two comorbidity         | 0                         | 0.0                                | 100.0                             | 0                                       | 100   |
| Arthritis               | 49                        | 90.0                               | 10.0                              | 5                                       | 100   |
| No comorbidity          | 31                        | 75.5                               | 12.5                              | 5                                       | 100   |
| One comorbidity         | 6                         | 15.7                               | 25.0                              | 5                                       | 100   |
| Two comorbidity         | 3                         | 6.0                                | 17.1                              | 5                                       | 100   |
| Cancer                  | 6                         | 10.0                               | 16.7                              | 5                                       | 100   |
| No comorbidity          | 43                        | 84.3                               | 17.3                              | 5                                       | 100   |
| One comorbidity         | 2                         | 43.0                               | 16.7                              | 5                                       | 100   |
| Two comorbidity         | 3                         | 71.0                               | 22.2                              | 5                                       | 100   |
| Acupuncture             | 3                         | 43.0                               | 17.3                              | 5                                       | 100   |
| No comorbidity          | 28                        | 84.9                               | 17.3                              | 5                                       | 100   |
| One comorbidity         | 3                         | 43.0                               | 17.3                              | 5                                       | 100   |
| Two comorbidity         | 1                         | 100.0                              | 22.2                              | 5                                       | 100   |
| Obesity                 | 51                        | 96.1                               | 3.9                               | 5                                       | 100   |
| No comorbidity          | 28                        | 96.1                               | 3.9                               | 5                                       | 100   |
| One comorbidity         | 4                         | 100.0                              | 22.2                              | 5                                       | 100   |
| Two comorbidity         | 1                         | 100.0                              | 22.2                              | 5                                       | 100   |
| Hypertension            | 29                        | 96.1                               | 3.9                               | 5                                       | 100   |
| No comorbidity          | 13                        | 94.9                               | 5.1                               | 5                                       | 100   |
| One comorbidity         | 6                         | 16.7                               | 25.0                              | 5                                       | 100   |
| Two comorbidity         | 1                         | 100.0                              | 22.2                              | 5                                       | 100   |
| Liver dysfunction       | 7                         | 96.1                               | 3.9                               | 5                                       | 100   |
| No comorbidity          | 4                         | 100.0                              | 22.2                              | 5                                       | 100   |
| One comorbidity         | 1                         | 100.0                              | 22.2                              | 5                                       | 100   |
| Two comorbidity         | 0                         | 0.0                                | 0.0                               | 5                                       | 100   |
Other traditional modalities were mostly acupuncture (29 patients), some others were avasin, cupping with fire, massage, acupressure, or far infrared therapy.

Table 2 showed numbers of herbal medicine given to patients at first visit, varied from one (58.6%), two (19.1%), three (15.6%), four (5.1%), to five items (1.6%). About half patients were given one herbal medicine, mostly to patients without or with one comorbidity. Patients with two comorbidities showed more numbers of herbal medicines given. The herbal medicine preparations were extracts in capsule/caplet/pill/tablet (38.6%), infusion (31.5%), ground herbs in capsule (25.8%), and the others were decoction, syrup, fermentation (liquid or solid), ground herbs, or brewed herbs. The combination of herbal preparation types by numbers of herbal showed in table 3.

| Numbers of herbal | 0 comorbidity | 1 comorbidity | 2 comorbidities | Total |
|-------------------|---------------|---------------|-----------------|-------|
| n                 | %             | n             | %              | n     | %    |
| 1                 | 235           | 61.0          | 79             | 57.2  | 17   | 40.5 | 331  | 58.6 |
| 2                 | 73            | 19.0          | 28             | 20.3  | 7    | 16.7 | 108  | 19.1 |
| 3                 | 54            | 14.0          | 21             | 15.2  | 13   | 31.0 | 88   | 15.6 |
| 4                 | 17            | 4.4           | 7              | 5.1   | 5    | 11.9 | 29   | 5.1  |
| 5                 | 6             | 1.6           | 3              | 2.2   | 0    | -    | 9    | 1.6  |
| Total             | 385           | 100           | 138            | 100   | 42   | 100  | 565  | 100  |

Table 3. Pattern of herbal preparation prescribed in 565 patients at first visit

| Types of herbal preparation | Patients with 1 herbal | 2 herbals | 3 herbals | 4 herbals | 5 herbals | Total patients |
|-----------------------------|------------------------|----------|-----------|-----------|-----------|----------------|
|                             | n   | %    | n   | %    | n   | %    | n   | %    | n   | %    |
| Extract (capsule)*          | 133 | 40.2 | 48  | 44.4 | 19  | 21.6 | 10  | 34.5 | 8   | 88.9 | 218 | 38.6 |
| Infusion                    | 119 | 36.0 | 38  | 35.2 | 24  | 27.3 | 4   | 13.8 | 0   | -    | 185 | 32.7 |
| Ground herbs (capsule)      | 45  | 13.6 | 0   | -    | 23  | 26.1 | 5   | 17.2 | 0   | -    | 73  | 12.9 |
| Decoction                   | 21  | 6.3  | 0   | -    | 0   | -    | 0   | -    | 0   | -    | 21  | 3.7  |
| Ground herbs (brewed)       | 6   | 1.8  | 0   | -    | 0   | -    | 0   | -    | 0   | -    | 6   | 1.1  |
| Extract (syrup)             | 5   | 1.5  | 0   | -    | 0   | -    | 0   | -    | 0   | -    | 5   | 0.9  |
| Fermentation (liquid/solid) | 2   | 0.6  | 0   | -    | 0   | -    | 0   | -    | 0   | -    | 2   | 0.4  |
| 1 extract (capsule) & 1 infusion | 0   | -    | 12  | 11.1 | 0   | -    | 0   | -    | 0   | -    | 12  | 2.1  |
| 1 extract (capsule) & 1 ground herbs (capsule) | 0   | -    | 7   | 6.5  | 0   | -    | 0   | -    | 0   | -    | 7   | 1.2  |
| 1 infusion & 1 ground herbs (capsule) | 0   | -    | 1   | 0.9  | 0   | -    | 0   | -    | 0   | -    | 1   | 0.2  |
| 1 extract (capsule) & 1 extract (syrup) & 1 ground herbs (brewed) | 0   | -    | 1   | 0.9  | 0   | -    | 0   | -    | 0   | -    | 1   | 0.2  |
| 1 extract (capsule) & 2 Ground herbs (capsule) | 0   | -    | 1   | 0.9  | 0   | -    | 0   | -    | 0   | -    | 1   | 0.2  |
| 2 extract (capsule) & 1 infusion | 0   | -    | 0   | -    | 12  | 13.6 | 0   | -    | 0   | -    | 12  | 2.1  |
| 2 extract (capsule) & 1 ground herbs (capsule) | 0   | -    | 0   | -    | 5   | 5.7  | 0   | -    | 0   | -    | 5   | 0.9  |
| 1 ground herbs (capsule) & extract (syrup) & ground herbs (brewed) | 0   | -    | 0   | -    | 1   | 1.1  | 0   | -    | 0   | -    | 1   | 0.2  |
| 1 extract (capsule) & 3 ground herbs (capsule) | 0   | -    | 0   | -    | 0   | -    | 5   | 17.2 | 0   | -    | 5   | 0.9  |
| 1 extract (capsule) & 2 ground herbs (capsule) & 1 infusion | 0   | -    | 0   | -    | 0   | -    | 1   | 3.4  | 0   | -    | 1   | 0.2  |
2 extract (capsule) & 2 ground herbs (capsule) & 2 extract (capsule) & 1 infusion & 1 decoction
3 extract (capsule) & 1 infusion & 1 decoction
3 extract (capsule) & 1 ground herbs (capsule) & 1 infusion & 1 decoction
3 extract (capsule) & 1 infusion & 1 decoction
1 extract (capsule) & 3 infusion & 1 decoction

TOTAL 331 100 108 100 88 100 29 100 9 100 565 100

Extract in capsule/caplet/pill/tablet, infusion, and ground dried herbs were the most common herbal preparation prescribed. Herbal medicines produced by industry should have registration number and distribution permission form authority (National Agency of Drug and Food Control) [14]. Self-made herbs are not for sale and only allowed to be prescribed by the practitioner himself. Preparation in capsule or caplet or pill or tablet is more convenient than infusion or decoction for patients. Although regulation of Indonesian National Agency of Drug and Food Control on traditional medicine quality mentioned that ground dried herbs are not allowed to be prepared in capsule, more than 12.9% were prescribed so. Extract in capsule are usually single compound, therefore herbal medicine prescribed with more than one kind are mostly extract in capsule.

Traditional medicine is actually an important part of health care but still often underestimated. Traditional medicine was used by 30.4% Indonesian households, 60% Taiwanese population, and 76% Japanese population [15-17]. World Health Organization (WHO) published WHO Traditional Medicine Strategy 2002—2005 and then updated it into WHO Traditional Medicine Strategy 2014—2023 [18,19] as many countries have gradually come to accept the contribution of traditional medicine in individuals health and wellbeing. Not only herbal medicines but also other traditional and complementary medicine practices are increasing in demand. Capturing the pattern of services and proper record on traditional medicine become important to ensure it is done in a safe, respectful, cost-efficient, and effective manner.

4. CONCLUSION
The top 5 diagnoses recorded were dyspepsia, diabetes mellitus, hypertension, hemorrhoid, and arthritis. Almost three quarters patients had no comorbidity, treated with herbal only, and mostly in form of capsule and infusion. Herbal medicine services need to be recorded continuously to enrich the traditional medicine health services data.

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REFERENCES
[1] Republik Indonesia. Undang Undang No. 36 Tahun 2009 tentang Kesehatan.
[2] Republik Indonesia. Peraturan Pemerintah No.103 Tahun 2014 tentang Pelayanan Kesehatan Tradisional.
[3] Republik Indonesia. Keputusan Menteri No.121/Menkes/SK/II/2008 tentang Standar Pelayanan Medik Herbal.
[4] Widowati L. 2012. Laporan Penelitian: Studi observasi penggunaan jamu oleh dokter praktik jamu. Badan Penelitian dan Pengembangan Kesehatan. Jakarta.
[5] Widowati L. dkk. 2014. Laporan Penelitian: Jamu Registri. Badan Penelitian dan Pengembangan Kesehatan. Jakarta.
[6] Delima, Siswoyo H, Nurhayati, Sihombing M. 2016. Laporan Penelitian: Registr Jamu tahun pertama: pencatatan medik berbasis web untuk pelayanan jamu/ramuan herbal pada pasien dari 10 penyakit oleh dokter praktik jamu di 7 provinsi. Badan Penelitian dan Pengembangan Kesehatan. Jakarta.
[7] Delima, dkk. 2018. Laporan Penelitian: Registr Jamu, Pencatatan medik berbasis web untuk pelayanan jamu/ramuan herbal pada pasien dari 10 penyakit oleh dokter-praktik jamu. Badan Penelitian dan Pengembangan Kesehatan. Jakarta.
[8] Direktorat Bina Pelayanan Kesehatan Tradisional, Alternatif, dan Komplementer. 2014. Laporan akuntabilitas kinerja tahun 2013. Direktorat Jendral Bina Gizi dan Kesehatan Ibu dan Anak Jakarta.
[9] Gliklich RE, Dreyer NA, Leavy MB, editors. Registries for evaluating patient outcomes: A user's guide [Internet]. 3rd edition. Rockville (MD): Agency for Healthcare Research and Quality (US); 2014 Apr. 1, Patient Registries. [cited 2018 Feb 13] Available from: http://www.ncbi.nlm.nih.gov/books/NBK208643/.
[10] Wong W, Lam CLK, Bian XZ, Zhang ZJ, Ng ST, Tung S. Morbidity pattern of traditional Chinese medicine primary care in the Hong Kong population. Sci Rep. 2017 Aug 8;7(1):7513. doi: 10.1038/s41598-017-07538-5. PMID: 28790344; PMCID: PMC5548865.
[11] Liu CY, Chu JY, Chiang JH, Yen HR, Hsu CH. Utilization and prescription patterns of traditional Chinese medicine for patients with hepatitis C in Taiwan: a population-based study. BMC Complement Altern Med. 2016 Oct 21;16(1):397. doi: 10.1186/s12906-016-1379-3. PMID: 27769222; PMCID: PMC5073439.
[12] Delima, Widowati L, Nugroho YA, Siswoyo H, Gitawati R, Purwadianto A. Gambaran praktik penggunaan jamu oleh dokter di enam provinsi di Indonesia. Buletin Penelitian Kesehatan. 2012: 40(3):109—122.

[13] Widowati L, Siswanto, Delima, Siswoyo H. Evaluasi praktik dokter yang meresepkan jamu untuk pasien penderita penyakit degenerative di 12 propinsi. Media Litbangkes. 2014: 24(2):95—102.

[14] Peraturan Badan Pengawas Obat dan Makanan Nomor 12 Tahun 2014 tentang Persyaratan mutu obat tradisional.

[15] Badan Penelitian dan Pengembangan Kesehatan RI. Laporan Penelitian: Riset Kesehatan Dasar 2013. Kementerian Kesehatan RI, Jakarta.

[16] Chen FP, Chen TJ, Kung YY, Chen YC, Chou LF, Chen FJ, Hwang SJ. Use frequency of traditional Chinese medicine in Taiwan. BMC Health Serv Res. 2007 Feb 23;7:26. doi: 10.1186/1472-6963-7-26. PMID: 17319950; PMCID: PMC1810531.

[17] Hori S, Mihaylov I, Vasconcelos JC, McCoubrie M. Patterns of complementary and alternative medicine use amongst outpatients in Tokyo, Japan. BMC Complement Altern Med. 2008 Apr 23;8:14. doi: 10.1186/1472-6882-8-14. PMID: 18433476; PMCID: PMC2375857.

[18] World Health Organization. WHO Traditional Medicine Strategy 2002–2005. Geneva: World Health Organization, 2002. Online document at: http://www.wpro.who.int/health_technology/book_wh o_traditional_medicine_strategy_2002_2005.pdf. Accessed October 01, 2019.

[19] World Health Organization. WHO Traditional Medicine Strategy 2014–2023. Geneva: World Health Organization, 2013. Online document at: http://www.searo.who.int/entity/health_situation_tren ds/who_trm_strategy_2014-2023.pdf?ua=1 Accessed October 01, 2019.