ORIGINAL ARTICLE

Psychotropic Polypharmacy among Elderly Patients with Mental Illness in a Malaysian University Hospital: A 10-Year Review of Hospital Databases

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ABSTRAK

Polifarmasi psikotropik dalam kalangan para pesakit tua merupakan suatu permasalahan kerana mereka menghidapi pelbagai penyakit yang lain. Kajian ini menyiasat polifarmasi psikotropik dalam kalangan pesakit tua yang didiscaj daripada sebuah hospital pengajar di Malaysia dan menentukan faktor-faktor yang berkaitan dengannya. Laporan discaj pesakit berumur 65 tahun dan ke atas dari wad-wad psikiatri antara tahun 2010 sehingga tahun 2019 dikaji semula. Data sosiodemografik bagi tempoh kemasukan wad ('Length of stay', LOS), diagnosis psikiatrik dan lain-lain, serta preskripsi ubat psikotropik semasa discaj diambil daripada pangkalan data elektronik. Analisis 'multiple logistic regression' dilaksanakan dengan umur, jantina, bangsa, status perkahwinan, diagnosis psikiatrik utama, LOS, dan jumlah komorbiditi perubatan sebagai pembolehubah tidak bersandar, manakala polifarmasi (>2 ubat psikotropik) sebagai pembolehubah bersandar. Terdapat 354 discaj dalam tempoh ini. Purata usia ialah 72.4 tahun (SD-5.9 tahun) di mana 63.0% ialah wanita dan 39.8% ialah bangsa Melayu. Kebanyakannya telah berkahwin (84.2%). Kategori diagnosis psikiatrik yang paling utama ialah gangguan mood (54.5%). Sebanyak 76.8% discaj melibatkan satu atau lebih komorbiditi perubatan. Jumlah median ubat psikotropik ialah dua, dengan 38.1% terima tiga atau lebih ubat psikotropik. Dalam model 'multiple regression', didapati jantina perempuan, bangsa Melayu, dan berkahwin berkait rapat dengan polifarmasi psikotropik. Faktor-foktor sosiobudaya mungkin menyumbang kepada polifarmasi psikotropik dalam kalangan pesakit tua. Faktor-faktor begini perlu disiasat lebih lanjut untuk mengenalpasti peranan mereka.

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Kata kunci: komorbiditi, penyakit mental, polifarmasi, ubat psikotropik, warga tua

ABSTRACT

Psychotropic polypharmacy among elderly patients is problematic due to their multiple comorbidities. This study investigated psychotropic polypharmacy among elderly patients discharged from a Malaysian university hospital and its associated factors. Discharges of patients aged 65 years or above from the psychiatric wards from 2010 to 2019 were reviewed. Sociodemographic data, length of stay (LOS), psychiatric and other diagnoses, and psychotropic prescription upon discharge were extracted from electronic databases. Multiple logistic regression was conducted with age, gender, race, marital status, main psychiatric diagnosis, LOS, and the number of medical comorbidities as independent variables, and polypharmacy (>2 psychotropics) as the dependent variable. There were 354 discharges in this period. The mean age was 72.4 years (SD=5.9 years); 63.0% were female and 39.8% were Malays. Most were married (84.2%). The commonest category of psychiatric diagnosis was mood disorders (54.5%). A total of 76.8% of the discharges involved one or more medical comorbidities. The median number of psychotropics was two, with 38.1% prescribed three or more psychotropics. In the multiple regression model, female gender, Malay race, and being married were significantly associated with psychotropic polypharmacy. Sociocultural factors may contribute to psychotropic polypharmacy among elderly patients. Such factors require further investigations to elucidate their roles.

Keywords: aged, comorbidity, mental disorders, polypharmacy, psychotropic drugs

INTRODUCTION

Recent statistics have projected that between 2020 and 2046, the percentage of elderly Malaysians will rise considerably from 7 to 14%, exceeding 6 million people (Department of Statistics Malaysia 2018). Accordingly, there will be more individuals with pre-existing mental illness who mature into old age. Moreover, the elderly are also more susceptible to psychiatric morbidities due to medical issues such as degenerative processes, problems with physical health, and cerebral pathologies. Additionally, socioeconomic factors such as decreased economic independence and breakdown of the family support system also contribute to the problem (Khandelwal 2003). The high prevalence of psychiatric conditions among the older adults accordingly translates into very common prescriptions of psychotropic drugs in this population (Hartikainen et al. 2005).

Psychotropic drugs, including antidepressants, mood stabilisers, anxiolytics, and antipsychotics, are

among the most common medications prescribed to the elderly (Bareis et al. 2018). A study in France showed that a quarter of elderly people aged 65 years and above who lived at home and up to three-quarters of those in institutions, received psychotropic medications (Loggia et al. 2020). The broad spectrum of action and indications of psychotropic medications may explain their widespread use. For instance, antidepressants are prescribed for a wide array of illnesses besides depression (e.g., chronic pain, anxiety, and smoking cessation), while anxiolytics are not only used to treat anxiety but also alleviate sleep disorders (Hartikainen et al. 2005). Older adults with multiple comorbidities are often prescribed other classes of medications to manage different conditions, resulting in a greater tendency for polypharmacy.

At the same time, the concept of polypharmacy is fluid. A systematic review of the definitions of polypharmacy identified 138 different definitions (Masnoon et al. 2017), of which the nature is either numerical or descriptive. The numerical definition specifies the duration of therapy such as >2 medications for a period >240 days, >5 medications for >90 days to >10 medications during a hospital stay. Meanwhile, descriptive definitions differentiate potentially inappropriate medications, medication underuse, and duplication based on consensus-based tools such as Beers criteria (Maggiore et al. 2010). Most often, polypharmacy is commonly defined in terms of the number of medications been taken by an individual at a given time (Khezrian et al. 2020).

Regardless of the uncertainty over its definition, polypharmacy amongst the elderly is detrimental as it is associated with serious adverse events such as the increased risk of hip fracture when five or more drugs were used (Lai & Liao 2013). Nearly 50% of older adults who took one or more medications that were not medically necessary experienced greater health care costs coupled with unnecessary adverse drug events and multiple geriatric syndromes (Maher et al. 2014). Frailty, gait disturbances, and cognitive impairments are strongly associated with polypharmacy (Moulis et al 2015; Li et al. 2018).

Some studies have found several factors associated with psychotropic polypharmacy. Sociocultural factors, such as family expectations and care settings, may influence psychotropic prescription practice (Ng & Klimidis 2008).

The primary objective of this study was to examine the pattern of psychotropic medication prescription in Malaysia among elderly patients who were discharged from psychiatry wards, including the number and types of medications, to determine the level of psychotropic polypharmacy. Secondarily, we aimed to explore the relationship between psychotropic polypharmacy and sociodemographic and clinical factors in the study population.

MATERIALS AND METHODS

This study was conducted in Universiti Kebangsaan Malaysia Medical Centre (UKMMC), a Malaysian university

hospital located in the Kuala Lumpur metropolitan area. It was a retrospective review of electronic clinical databases of the hospital. The targeted study population was all elderly patients who had been treated in and discharged from the male and female psychiatry wards of the study site over 10 years from the year 2010 to 2019. Patients aged 65 years old at the time of discharge were included in the study. As the estimated study population size was quite small (<500) from estimations based on ward censuses, all discharges that fulfilled the inclusion criteria were included in the review.

The required information was extracted from hospital information systems. The authors were granted the access to the requested data by the hospital databases management unit. Sociodemographic and clinical data for each hospitalisation record were extracted from the electronic medical information system, while psychotropic prescription records upon discharge were retrieved from the pharmacy information system. The sociodemographic variables included were age, gender, race, religion, and marital status. The clinical variables were the primary psychiatric diagnosis according to the International Classification of Diseases, Tenth Revision (ICD-10), comorbid conditions according to the ICD-10 classification, length of stay (LOS) in the ward, and psychotropic medications prescribed upon discharge by classes. When the same patient had multiple admissions during the period, data from each admission was recorded separately as individual entries.

The data were entered into a spreadsheet. Thorough check was conducted to remove invalid records with missing data. From the extracted data, descriptive statistics were generated. Based on the median number of psychotropic prescribed, prescriptions at discharge were divided into two groups: psychotropic polypharmacy (>median number of psychotropics prescribed) and no psychotropic polypharmacy (≤median number of psychotropics prescribed). Multiple logistic regression analysis was conducted using the backward elimination procedure including sociodemographic variables (age, gender, race, marital status), main psychiatric diagnosis, LOS, and the number of medical comorbidities in the model as independent variables, with psychotropic polypharmacy as the dependent variable. Statistical analysis was conducted using the IBM SPSS Version 26.0 (IBM Corp., Armonk, NY, USA) software.

This study received ethics approval from the Research Ethics Committee of the university hospital where the study was conducted (Approval Number: UKM PPI/111/8/JEP-2020-480).

RESULTS

The sociodemographic and clinical characteristics of all admissions during the study period are shown in Table 1. The total number of discharges involving geriatric patients from 1 January 2010 to 31 December 2019 from the male and female psychiatry wards of the hospital was 354. The

Table 1: Sociodemographic and clinical characteristics of all discharges during the study period (N=354)

Variable	Mean (SD)	Median (IQR)
Age (years)	72.4 (5.9)	71.5 (67.0-76.0)
Duration of admission (days)	23.0 (18.0)	20.0 (10.0-30.0)

Variable	N	%
Gender		
Male	131	37.0
Female	223	63.0
Race		
Malay	141	39.8
Chinese	159	44.9
Indian	44	12.4
Others	9	2.5
Missing	1	0.3
Religion		
Islam	148	41.8
Buddhism	144	40.7
Hinduism	26	7.3
Christianity	22	6.2
Others	11	3.1
Missing	3	0.8
Marital status		
Married	298	84.2
Single	19	5.4
Widowed/Divorced	30	8.5
Missing	7	2.0
Psychiatric diagnosis		
Organic, including symptomatic, mental disorders (F00-F09)	88	24.9
Mental and behavioural disorders due to psychoactive substance use (F10-F19)	3	0.8
Schizophrenia, schizotypal and delusional disorders (F20-F29)	56	15.8
Mood [affective] disorders (F30-F39)	193	54.5
Neurotic, stress-related and somatoform disorders (F40-F49)	12	3.4
Disorders of adult personality and behaviour (F60-F69)	1	0.3
Pervasive developmental disorders (F90-F98)	1	0.3

median number of discharges was 30 per year (range: 30 to 46 per year). The mean age of the discharges was 72.4 years (SD: 5.9 years); 63.0% of the discharges involved female patients. Chinese were the most represented ethnic group at 44.9%, followed by Malays (39.8%). The proportions of religious affiliations corresponded closely with the ethnic breakdowns. Most patients were recorded as married (84.2%).

The most common psychiatric diagnosis was mood disorders (F30-F39) at 54.5%, the majority of which were diagnosed with major depressive disorder. It was followed by organic, including symptomatic, mental disorders (F00-F09) at 24.9%, mostly consisted of patients diagnosed with dementia of various aetiologies. At the same time, 76.8% (n=272) of the discharges involved patients with one or more medical comorbidities

Table 2: Medical comorbidities in all discharges during the study period (N=354)

Variable	N	%
Certain infectious and parasitic diseases (A00-B99)		
1	13	3.7
2	1	0.3
3	0	0.0
Neoplasms (C00-D48)		
1	10	2.8
2	1	0.3
3	1	0.3
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism (D50-D89)		
1	22	6.2
2	2	0.6
3	0	0.0
Endocrine, nutritional, and metabolic diseases (E00-E90)		
1	124	35.0
2	48	13.6
3	14	4.0
Diseases of the nervous system (G00-G99)		
1	63	17.8
2	6	1.7
3	1	0.3
Diseases of the eye and adnexa (H00-H59)		
1	7	2.0
2	1	0.3
3	0	0.0
Diseases of the ear and mastoid process (H60-H95)		
1	13	3.7
2	1	0.3
3	0	0.0
Diseases of the circulatory system (I00-I99)		
1	144	40.7
2	55	15.5
3	17	4.8
Diseases of the respiratory system (J00-J99)		
1	20	5.6
2	5	1.4
3	1	0.3
Diseases of the digestive system (K00-K93)		
1	20	5.6
2	7	2.0
3	0	0.0
Diseases of the skin and subcutaneous tissue (L00-L99)		
1	5	1.4
2	1	0.3
3	0	0.0
Diseases of the musculoskeletal system and connective tissue (M00-M99)		
1	20	5.6
2	3	0.8
3	0	0.0

Variable	N	%
Diseases of the genitourinary system (N00-N99)		
1	40	11.3
2	13	3.7
3	2	0.6

(Table 2). The median number of comorbidities was 2 (IQR: 1-4). The most common category of medical comorbidities was diseases of the circulatory system (I00-I99), with 40.7% of discharges recorded at least one diagnosis in this category, mostly in the form of hypertensive disorders. The second most common category was endocrine, nutritional, and metabolic diseases (E00-E90) at 35%, the majority of which had diabetes mellitus as the diagnosis.

Most of the admissions (95.5%, n=338) involved the prescription of one or more psychotropics upon discharge. The median number of psychotropics was 2 (IQR: 1-3), with 74.3% (n=263) were prescribed two or more psychotropics and 38.1% (n=135) were prescribed three or more psychotropics. As shown in Table 3, antipsychotics were the most frequently prescribed psychotropic medications by classes, with 242 (68.4%) discharges prescribed antipsychotics and 30 (8.5%) discharges receiving two antipsychotics concurrently.

Table 3: Psychotropics prescribed upon discharge for all discharges during the study period (N=354)

Variable	N	%
Antidepressants		
SSRIs	114	32.2
SNRIs	21	5.9
NaSSA (Mirtazapine)	43	12.1
TCAs	5	1.4
Agomelatine	1	0.3
Vortioxetine	1	0.3
NDRI (Bupropion)	0	0.0
Antipsychotics		
First-generation oral	25	7.1
First generation depot	12	3.4
Second-generation oral	222	62.7
Second-generation depot	9	2.5
Anxiolytics/hypnotics		
Benzodiazepines	100	28.2
Zolpidem	95	26.8
Mood stabilizers		
Lithium	9	2.5
Anticonvulsants	37	10.5
Cognitive enhancers		
AChE inhibitors	57	16.1
Memantine	35	9.9
Anticholinergic agent (Benzhexol)	39	11.0

Table 4: Factors associated with polypharmacy in logistic regression analysis

Variable	Adjusted OR	95% C.I.		p-value[a]
		Lower	Upper	
Gender				
Male (Reference)	1.00	1.12	2.90	0.016
Female	1.80			
Race				
Non-Malay (Reference)	1.00	1.46	3.63	<0.001
Malay	2.30			
Marital status				
Single/Widowed/Divorced (Reference)	1.00	2.22	11.13	<0.001
Married	4.97			

[a]p-value is derived by multivariable backward logistic regression (p=0.05 to remove variables from the model). χ^2=36.938, df=3, p<0.001; Nagelkerke R^2=0.135

Far more discharges involved prescription of second-generation antipsychotics (SGAs) compared to first-generation antipsychotics (FGAs), with 62.7% of the discharges included the prescription of oral second-generation antipsychotics. A total of 173 (48.9%) discharges were prescribed antidepressants; 13 (3.7%) discharges received two antidepressants concurrently. Selective serotonin reuptake inhibitors (SSRIs) were the most frequently prescribed antidepressants (32.2%). A total of 160 (45.2%) discharges were prescribed sedative-hypnotics; 40 (11.3%) discharges received two sedative-hypnotics concurrently.

A multiple logistic regression model was tested with sociodemographic variables, main psychiatric diagnosis, LOS, and the number of medical comorbidities as independent variables and polypharmacy (>2 psychotropics prescription) as the dependent variable. In the final regression model, the factors found to be significantly associated with polypharmacy upon discharge were female gender, Malay ethnicity, and being married (Table 4). The Hosmer-Lemeshow statistic indicates a good fit for the regression model (χ^2=1.486, df=4, p=0.829).

As antipsychotics were the most prescribed psychotropics among all discharges, we further examined if different categories of antipsychotic prescriptions (both typical and atypical, typical alone, atypical alone, or none) were associated with psychotropic polypharmacy using chi-square test (Table 5). We found that, reasonably, discharges with concurrent typical and atypical antipsychotic prescriptions were significantly more likely to be associated with psychotropic polypharmacy (p<0.001), whereas those prescribed neither typical nor atypical antipsychotic prescription were associated with significantly lower likelihood of psychotropic polypharmacy (p<0.001). However, on their own, both typical and atypical antipsychotic prescriptions had no statistically significant association with psychotropic polypharmacy.

Table 5: Additional comparisons between different categories of psychotropic prescriptions among the discharges on the proportions of psychotropic polypharmacy

Category of antipsychotic prescription	Psychotropic polypharmacy				p-value[a]
	Yes		No		
	N	%	No	%	
None	18	16.1	94	83.9	<0.001*
Typical	10	58.8	7	41.2	0.0712
Atypical	92	43.8	118	56.2	0.008
Both typical and atypical	15	100.0	0	0.0	<0.001*

[a]Chi-square test; *Statistically significant (Significance level=0.00625 with Bonferroni correction)

DISCUSSION

A high prevalence of psychotropic polypharmacy was found in the current study, with three-quarters of the patients prescribed two or more psychotropics and near to 40% prescribed three or more psychotropics. Population studies among elderly with dementia in the community have found prevalence rates of ≥2 psychotropic drugs from 18% to 25% (Orsel et al. 2018; Nørgaard et al. 2017). In a cohort of hospitalised elderly patients (≥70 years old) in Irish hospitals, about 20% were prescribed 2 psychotropic drugs; the percentage was higher among patients with dementia (36.7%) (Walsh et al. 2016). Thus, in comparison, the prevalence of psychotropic polypharmacy was high in this study.

Among the elderly, physiological changes such as increased body fat, less plasma albumin, less body water, fewer brain cells as well as slower liver and renal metabolisms render the elderly more prone to greater psychotropic effects (Strome & Howell 1991). Nevertheless, a prescribing cascade often develops when an adverse drug effect (ADE) is misinterpreted as a new clinical condition and additional drug therapy is then prescribed to treat this condition (Rochon & Gurwitz 1997). The ADE may be brought about by drug interactions and polypharmacy from different medications used to treat a patient's other comorbidities. This is evident in this study where 76.8% of patients had comorbidities. Besides, the elderly may have underlying non-compliance issue, particularly those who do not have good family support, are living alone or are neglected at nursing homes. It is postulated that due to a lack of compliance monitoring, communication barriers, and insufficient understanding, clinicians often perceive the particular psychotropics assumed been taken as ineffective and thus adding other agents to produce a synergistic effect, culminating in polypharmacy.

We found that female gender was an associated factor of psychotropic polypharmacy. According to data from the Department of Statistics Malaysia, for the Malaysian population males at the age of 60 years are expected to live until the age of 78.4 years while females up to 81.2 years. The gaps for males' and females' life expectancy at the age

of 60 years are between 2.4 to 2.8 years for 2014-2020 (Department of Statistics Malaysia 2020). However, longer life expectancy amongst females does not equate to better health or quality of life. For instance, older women are more likely to develop dementia, with 38% greater risk than older men (Hurd et al. 2013). Inadvertently, women with dementia also experience increased multiple cocktails usage of psychotropic medication, being driven by increased use of antidepressants, hypnotics, sedatives, and anxiolytics (Wattmo et al. 2014).

Moreover, greater proportion of females are caregivers, especially to their spouse, and may exhibit a higher prevalence of mood disorders, rendering the need of multiple medications (Choi & Vasunilashorn 2014). Additionally, as elderly females enter the postmenopausal phase of their life, they experience not only changes in sex hormones and reproductive function, with associated alterations in metabolism and behaviours, but also many stressful events in the personal, domestic, and professional spheres. This transition often affects a woman's quality of life and overall functioning, thus contributing to higher risks of mental illness, such as depression and the need of psychotropic treatment (Soares 2013).

SGAs were the class of psychotropic medication found to be most prescribed upon discharge in this study. Compared with FGAs, the use of SGAs is favoured as it appears to be associated with less cognitive impairment, especially among elderly patients (Solmi et al. 2017). However, it is also well-known that the use of SGAs often leads to adverse cardiometabolic effects (De Hert et al. 2011). This fact is particularly important to take into consideration given that many in the elderly population suffer from diseases of the circulatory system such as hypertension, stroke, and ischaemic heart disease as well as metabolic diseases, especially diabetes mellitus and dyslipidemia. Thus, it is very important for prescribers to carefully weigh the benefits and risks of prescribing SGAs. It is noteworthy that even among SGAs, individual agents carry different propensities for weight gain and other metabolic side effects (Pillinger et al. 2020). Better understanding of the side effect profiles of individual SGAs among prescribers will contribute towards more rational and appropriate use of these agents among the elderly.

Present guidelines recommend antidepressants, specifically SSRIs, as the first-line treatment of depression in the elderly (Shah et al. 2012). In most places, the use of SSRIs has overtaken the use of tricyclic antidepressants (Mottram et al. 2006). This trend is also reflected in the results of the current study. While SSRIs are superior to older antidepressants in the elderly population in certain aspects of their side effect profile, such as lesser cardiotoxicity, they do come with other detrimental consequences such as falls, hyponatremia, and stroke (Coupland et al. 2011). Amongst the SSRIs, citalopram, escitalopram, and sertraline are preferred considering their safety profile in the elderly owing to their lesser cytochrome P450

interaction, as opposed to less safe SSRIs such as fluoxetine, paroxetine, and fluvoxamine which have higher risks of drug-drug interactions (Chew-Graham et al. 2004).

Frequent use of benzodiazepines among the elderly has been a grave concern. In the United States, more than 10% of women and 6% of men aged 65 to 80 years filled at least one prescription for benzodiazepines in a year, with approximately one-third of them receiving benzodiazepines for longer than 120 days in a year (Olfson et al. 2015). As benzodiazepine use may predispose the elderly to various complications such as fall, fracture, dependence, dementia, cognitive decline, and mortality, there is an urgent need to establish better benzodiazepine prescription practice among clinicians. In this respect, important issues at individual levels, such as insufficient knowledge on adverse effects, lack of skills and training in tapering regimen, poor doctor-patient relationship, as well as institutional issues including limited availability of psychotherapists, absence of scheduled medication reviews, and limited access to consultation with psychiatrists may contribute to this prescribing pattern, which must be tackled properly (Anderson et al. 2014).

Chronic usage of benzodiazepines caused drowsiness, ataxia, motor incoordination, and anterograde amnesia in the elderly. Therefore, proper screening of long-term benzodiazepine use among these patients is essential. The Screening Tool of Older Persons' Prescription (STOPP) and the Screening tool to alert to Right Treatment (START) are two examples of tools that can be used to review potentially inappropriate medications in older adults (O'Mahony et al. 2015). These tools are instrumental in mitigating the abuse of benzodiazepines pursuant to the Beer's Criteria. In the Pharmacy Department, UKMMC, vigorous screening is made to confirm the duration and need of long-term benzodiazepines amongst the elderly, especially when it involves drug interactions. There was also prescription abuse in some instances where patients claimed medications were lost or confiscated, rendering the need for a police report to investigate and confirm the loss. All recordings of the supply of benzodiazepines are made in a DDA (Dangerous Drug Act) Logbook and critically revised with the current treating psychiatrists attending to the patients.

Our study found that married patients were more likely to experience psychotropic polypharmacy. We speculate that this phenomenon may be related to the different types of caregivers involved in married versus non-married patients. In Malaysia, except for patients who are placed in residential or nursing homes, the main caregivers for married patients are usually their spouses, whereas, for non-married patients, it is usually children (if widowed) or more distant relatives (if single). It might be that there is a higher level of concern and hence reported symptoms by spousal caregivers compared with other caregivers, leading to a greater tendency of married patients to be prescribed multiple medications

to manage their symptoms. Such a hypothesis of course requires further investigation to be proven.

Cultural differences and preferences may influence the presentation of mental illness in the elderly, such as dementia and mild cognitive impairment, thereby affect intervention strategies and prescribing patterns (Chiang-Hanisko 2016). Our finding that Malay ethnicity was a significant factor for psychotropic polypharmacy might reflect this association. Ethnic identity can be an important determining factor of cultural norms, values, and preferences (Desmet et al. 2017). In the Malaysian context, the precise Malay cultural factors that may increase the tendency of psychotropic prescription as compared to other local cultures remain to be elucidated.

A few limitations of the study need to be mentioned. As a single-site study in an urban area, the study findings may not be generalisable to the Malaysian population. As the study data were extracted from electronic databases, it cannot be ruled out that there could be misclassification biases for certain information, such as diagnoses and sociodemographic data. Furthermore, important clinical information that could have influenced prescription practice, such as symptom severity, was unavailable. Finally, as each discharge record was recorded separately, records of patients with multiple discharges might affect the data to some extent.

CONCLUSION

Our study found that sociocultural

factors, such as gender, marital status, and ethnoreligious factors may be associated with psychotropic polypharmacy among elderly patients. More investigations into such factors are required to better understand the causal relationships, if any, between them and psychotropic polypharmacy in the elderly, in our efforts to improve psychotropic prescription practice in this vulnerable population.

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REFERENCES

Anderson, K., Stowasser, D., Freeman, C., Scott, I. 2014. Prescriber barriers and enablers to minimising potentially inappropriate medications in adults: A systematic review and thematic synthesis. *BMJ Open* **4**: e006544.

Bareis, N., Sando, T.A., Mezuk, B., Cohen, S.A. 2018. Association between psychotropic medication polypharmacy and an objective measure of balance impairment among middle-aged adults: Results from the US National Health and Nutrition Examination Survey. *CNS Drugs* **32**(9): 863-71.

Chew-Graham, C., Baldwin, R., Burns, A. 2004. Treating depression in later life. *BMJ* **329** (7459): 181-2.

Chiang-Hanisko, L. 2016. Cultural aspects of polypharmacy and mild cognitive impairment. *J Transcult Nurs* **27**(3): 312.

Choi, K.H., Vasunilashorn, S. 2014. Widowhood, age heterogamy, and health: the role of selection, marital quality, and health behaviors. *J Gerontol B Psychol Sci Soc Sci* **69**(1): 123-34.

Coupland, C., Dhiman, P., Morriss, R., Arthur, A., Barton, G., Hippisley-Cox, J. 2011. Antidepressant use and risk of adverse outcomes in older people: population based cohort study. *BMJ* **343**: d4551.

De Hert, M., Detraux, J., van Winkel, R., Yu, W., Correll, C.U. 2011. Metabolic and cardiovascular

adverse effects associated with antipsychotic drugs. *Nat Rev Endocrinol* **8**(2): 114-126.

Department of Statistics Malaysia. 2018. *Population and Ageing Newsletter*. Kuala Lumpur.

Department of Statistics Malaysia. 2020. *Press Release: Abridged Life Tables, Malaysia, 2018-2020*. Kuala Lumpur.

Desmet, K., Ortuño-Ortín, I., Wacziarg, R. 2017. Culture, ethnicity, and diversity. *Am Econ Rev* **107**(9): 2479-513.

Hartikainen, S., Mäntyselkä, P., Louhivuori-Laako, K., Enlund, H., Sulkava, R. 2005. Concomitant use of analgesics and psychotropics in home-dwelling elderly people-Kuopio 75 + study. *Br J Clin Pharmacol* **60**(3): 306-10.

Hurd, M.D., Martorell, P., Langa, K.M. 2013. Monetary costs of dementia in the United States. *N Engl J Med* **369**(5): 489-90.

Khandelwal, S.K. 2003. Mental health of older people. In *Ageing in India: Situational Analysis and Planning for The Future. Edited by* Dey AB. New Delhi: Rakmo Press.

Khezrian, M., McNeil, C.J., Murray, A.D., Myint, P.K. 2020. An overview of prevalence, determinants and health outcomes of polypharmacy. *Ther Adv Drug Saf* **11**: 2042098620933741.

Lai, S.-W., Liao, K.-F. 2013. Optimal cutoff of polypharmacy and outcomes. *J Clin Epidemiol* **66**(4): 465.

Li, K.Z.H., Bherer, L., Mirelman, A., Maidan, I., Hausdorff, J.M. 2018. Cognitive involvement in balance, gait and dual-tasking in aging: A focused review from a neuroscience of aging perspective. *Front Neurol* **9**: 913.

Loggia, G., Attoh-Mensah, E., Pothier, K., Morello, R., Lescure, P., Bocca, M.L., Marcelli, C., Chavoix, C. 2020. Psychotropic polypharmacy in adults 55 years or older: A risk for impaired global cognition, executive function, and mobility. *Front Pharmacol* **10**: 1659.

Maggiore, R.J., Gross, C.P., Hurria, A. 2010. Polypharmacy in older adults with cancer. *Oncologist* **15**(5): 507-22.

Maher, R.L., Hanlon, J., Hajjar, E.R. 2014. Clinical consequences of polypharmacy in elderly. *Expert Opin Drug Saf* **13**(1): 57-65.

Masnoon, N., Shakib, S., Kalisch-Ellett, L., Caughey, G.E. 2017. What is polypharmacy? A systematic review of definitions. *BMC Geriatrics* **17**: 230.

Mottram, P., Wilson, K., Strobl, J. 2006. Antidepressants for depressed elderly. *Cochrane Database Syst Rev* **(1)**: CD003491.

Moulis, F., Moulis, G., Balardy, L., Gérard, S., Sourdet, S., Rougé-Bugat, M.E., Lapeyre-Mestre, M., Montastruc, J.L., Rolland, Y., Vellas, B. 2015. Searching for a polypharmacy threshold associated with frailty. *J Am Med Dir Assoc* **16**(3): 259-61.

Ng, C.H., Klimidis, S. 2008. Cultural factors and the use of psychotropic medications. In *Ethno-psychopharmacology: Advances in Current Practice*. Edited by Ng CH, Lin K-M, Singh BS, Chiu E. Cambridge: Cambridge University Press; 123-34.

Nørgaard, A., Jensen-Dahm, C., Gasse, C., Hansen, E.S., Waldemar, G. 2017. Psychotropic Polypharmacy in patients with dementia: Prevalence and predictors. *J Alzheimers Dis* **56**(2): 707-16.

Olfson, M., King, M., Schoenbaum, M. 2015. Benzodiazepine use in the United States. *JAMA Psychiatry* **72**(2): 136-42.

O'Mahony, D., O'Sullivan, D., Byrne, S., O'Connor, M.N., Ryan, C., Callagher, P. 2015. STOPP/START criteria for potentially inappropriate prescribing in older people: version 2. *Age Ageing* **44**(2): 213-18.

Orsel, K., Taipale, H., Tolppanen, A.M., Koponen, M., Tanskanen, A., Tiihonen, J., Gardarsdottir, H., Hartikainen, S. 2018. Psychotropic drugs use and psychotropic polypharmacy among persons with Alzheimer's disease. *Eur Neuropsychopharmacol* **28**(11): 1260-9.

Pillinger, T., McCutcheon, R.A., Vano, L., Mizuno, Y., Arumuham, A., Hindley, G., Beck, K., Natesan, S., Efthimiou, O., Cipriani, A., Howes, O.D. 2020. Comparative effects of 18 antipsychotics on metabolic function in patients with schizophrenia, predictors of metabolic dysregulation, and association with psychopathology: a systematic review and network meta-analysis. *Lancet Psychiatry* **7**(1): 64-77.

Rochon, P.A., Gurwitz, J.H. 1997. Optimising drug treatment for elderly people: the prescribing cascade. *BMJ* **315**(7115): 1096-9.

Shah, S., Schoenbachler, B., Streim, J., Meeks, S. 2012. Antidepressant prescribing patterns in the nursing home: second-generation issues revisited. *J Am Med Dir Assoc* **13**(4): 406.e13-8.

Soares C.N. 2013. Depression in peri- and postmenopausal women: prevalence, pathophysiology and pharmacological management. *Drugs Aging* **30**(9): 677-85.

Solmi, M., Murru, A., Pacchiarotti, I., Undurraga, J., Veronese, N., Fornaro, M., Stubbs, B., Monaco, F., Vieta, E., Seeman, M.V., Correll, C.U., Carvalho, A.F. Safety, tolerability, and risks associated with first- and second-generation antipsychotics: a state-of-the-art clinical review. *Ther Clin Risk Manag* **13**: 757-77.

Strome, T., Howell, T. 1991. How antipsychotics affect the elderly. *Am J Nurs* **91**(5):46-9.

Walsh, K.A., O'Regan, N.A., Byrne, S., Browne, J., Meagher, D.J., Timmons, S. 2016. Patterns of psychotropic prescribing and polypharmacy in older hospitalized patients in Ireland: the influence of dementia on prescribing. *Int*

Psychogeriatr **28**(11): 1807-20.

Wattmo, C., Londos, E., Minthon, L. 2014. Solitary living in Alzheimer's disease over 3 years: association between cognitive and functional impairment and community-based services. *Clin Interv Aging* **9**: 1951-62.