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ARTICLE

Complementary of Nursing Care for an Elderly Family: Management of Hypertension and Smoking Behaviour

Imelda Rahmayunia Kartka* **Mulya Ulfa**

Nursing Program, Health Faculty, Fort De Kock University, Bukittinggi, Indonesia

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ABSTRACT

Background: An elderly was closed to some medical problem, especially hypertension. Problems that occur in elderly patients with hypertension not only involve the patient itself but also involve the family as the closest person to the patient. One important aspect of family nursing is the family itself. To achieve good treatment outcomes, implementation of evidence-based nursing is needed. The purpose of this study is to present the implementation of evidence-based nursing to an eldelry in a family bu using coconut water to reduce high blood pressure and progressive muscle relaxation therapy to reduce pain intensity in hypertensive patients, as well as acupressure therapy in stopping smoking that is applied 1 week each other. **Method:** In the implementation, complementary therapy is applied to hypertensive patients by given young coconut water and progressive muscle relaxation therapy, and acupressure therapy in an effort to stop smoking. **Results:** showed significant results in the reduction of high blood pressure before being given an intervention was TD: 200/100 mmHg and after being given the intervention obtained TD: 140/80 mmHg and decreased pain intensity in hypertensive patients using relaxation therapy, as well as a decrease in the number of cigarettes smoked with acupressure therapy for 1 week. **Conclusion:** The application of complementary therapy carried out showed improvement in elderly patients suffering from hypertension and smoking behaviour, therefore, the application of evidence based nursing in providing nursing care is recommended. **Suggestion:** Complementary Nursing Case Study this is expended to be a reference material to improve health services and provide an overview in carrying out complementary nursing care to families, especially an elderly with comprehensive cases of hypertension (bio, psycho, social and spiritual).

1. Introduction

One of important aspect in family nursing is the family itself. Family is the smallest unit in society which is the client or recipient of nursing care. The family has an important role in determining how to care needed for family members who are sick. There are several type of family, including elderly family. In elderly family, the aged had functional roles to play both within the family and in the community. Care of the elderly was, therefore, obligatory for the family and the community [1]. Several important reasons are convincing why

**Corresponding Author:*
Imelda Rahmayunia Kartka,
Nursing Program, Health Faculty, Fort De Kock University, Bukittinggi, Indonesia;
Email: imelda.rahmayunia@fdk.ac.id

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the family unit should be the central focus of family nursing, namely in a family unit, dysfunction (disease, injury, separation) that occurs in one family member affects other family members who are the unit as a whole. In this part, nurse are having an important role as a caregiver to promote the whole healthy system in the family, especially in elderly family. Nurses need for the team and other healthcare professionals regarding health communication as an innovative technology, taking a health promotion and prevention programs for elderly [2]. One of the type of health prevention for elderly was using complementary care. Complementary therapy is a group of various medical systems, care practices and products that are generally not part of conventional medicine [3]. The wider community is now starting to switch from modern or medical medicine to complementary medicine, although modern medicine is also very popular among the public. In Indonesia, almost 40% of the total population and 70% of the rural population in Indonesia use alternative and complementary medicine [4].

The health or illness status of family members influences one another. An illness in the family affects the whole family and in turn affects the course of an illness and the health status of the family. Therefore, the effects of family health or illness status influence or depend on one another. The family tends to be a reactor to health problems and an actor in determining the health problems of family members [5]. Some health problem can be detected in a family with family nursing care doing by a nurse. In elderly family, the most case finding as a health problem was high blood pressure or hypertension. In the elderly, the most powerful predictor of risk is increased pulse pressure due to decreased diastolic and increased systolic blood pressure [6]. Hypertension is a condition in which blood pressure has increased which gives continuous symptoms to a target organ of the body. Blood pressure that exceeds 140/90 mmHg at rest is thought to have a high blood pressure. Always high blood pressure is a risk factor for stroke, heart attack, heart failure, and is the main cause of chronic heart failure [7] and it is obvious that it will dramatically increase the prevalence of this disease. In 70+-year-old patients, the prevalence of arterial (in particular systolic hypertension >140 mmHg.

Nearly 1 billion people worldwide have high blood pressure. Hypertension is one of the leading causes of premature death worldwide. In 2020 about 1.56 billion adults will live with hypertension. Hypertension kills nearly 8 million people every year in the world and nearly 1.5 million people annually in the East-South Asia region. About a third of adults in East-South Asia suffer from hypertension [8]. Based on data from the Ministry of Health's Research and Development [9] hypertension in Indonesia is a health problem with a high prevalence of 25.8%. The prevalence of hypertension in West Sumatra Province shows that it has reached 22.6%. Data from the West Sumatra Provincial Health Office in 2014, hypertension is the 5 largest disease suffered by the community with a total of 84,345 sufferers. The Padang City Health Office in 2015 showed that hypertension was the second most common disease with a total of 31,760 sufferers. The incidence of hypertension is seen from 22 health centers in the city of Padang. Based on existing data, the highest incidence of hypertension was at Andalas Health Center Padang city, with 1158 people in 2015.

There is an example elderly family in community supporting by Andalas Health Center Padang city who have an hypertension health problem. This family became a participant to be applied such a complementary nursing care. It was Mr. S's family which was an elderly family consist of Mr. S and Mrs. I who live in the same house as both. Based on the results of interviews with Mr.S's family (60 years) which the author did in April 2020, Mrs. I (58 years) had hypertension ± since 2 years ago which was marked by dizziness, the patient complained of headaches that spread to the shoulders, eyes. Dizzy, and had trouble sleeping. If these signs appear, Mrs. I always rested and took medicine from the shop or health center to reduce the pain in her head. At the time of the assessment, it appeared that Mr. S's family had less healthy behavior, such as smoking, not exercising enough and not maintaining hygiene.

The first role of the community nurse is as a service provider to provide nursing care through assessing existing nursing problems, planning nursing actions and evaluating the services that have been provided to individuals, families, and communities [5]. The second role of the nurse is as an educator and consultant, providing health education to individuals, families, groups and communities both at home, at health centers, and in the community in an organized manner in order to instill healthy behavior, so that behavior changes as expected in achieving a healthy degree of health occur optimally. The third role of the nurse is as a role model, the public health nurse must be able to provide a good example in the health sector to individuals, families, groups and the community about how to live healthy procedures that can be imitated and exemplified by the community. Nursing care can be done in the form of complementary therapy. There are many complementary therapies that can be done on families with family members who suffer from hypertension [10]. Based on the above phenomenon, the authors are interested in managing cases with "Family Nursing Care for elderly family

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with Hypertension".

2. Methods

2.1 Research Design

This case study follows the stages based on Polit and Beck (2010) [11] regarding the implementation of Evidence Based Nursing Practice (EBNP). The stage consists of five stages, namely: (1) raising questions (PICO), (2) looking for related evidence, (3) assessing the evidence obtained, and (5) evaluating the implementation of EBN. For the first stage, the questions raised are based on PICO (Problem, intervention, comparison and outcome), namely "*what can be done to reduce hypertension and pain scales in hypertensive patients, as well as therapy in an effort to stop smoking*?"

2.2 Settings

The application of EBN is carried out on Mr. S (60 yo) and his wife, Mrs. I (58 yo) with hypertension health problem. Even, Mr. S's also have smoking behavior. This family taken in in the community in "Nagari Talu", Padang, Indonesia.

2.3 Ethical Consideration

Before any intervention, the procedure is explained to the patient's family. Willingness of the family is given through informed consent. Before the EBN is implemented, a comprehensive assessment is carried out on the family.

2.4 Prosedural Application

After the questions were formulated by assesment, the second stage was carried out by searching for EBN using an electronic data base, namely google scholar. The results of the assessment of the articles found in the third stage recommend the application of giving young coconut water to reduce hypertension and progressive muscle relaxation therapy to reduce headaches in hypertensive patients, as well as acupressure therapy in an effort to stop smoking. The hypertension intervention was carried out for 1 week to provide young coconut water [12]. Therapy of giving young coconut water as much as 250cc / 3 times a day, namely morning, afternoon and evening for 7 days and tension was carried out on each respondent. Blood pressure was identified by using Sphygnomanomater. Progressive muscle relaxation therapy is carried out for ± 10 minutes with 1 movement a week carried out 3 times to reduce headache pain and reduce high blood pressure [13]. Pain scale was identified by using Numeric Pain Rating Scale. Acupressure therapy is an effort to quit smoking for families who smoke. The last stage is an evaluation of the implementation of the EBN. Assessment of blood pressure and pain scale was carried out every day after giving young coconut water and progressive muscle relaxation therapy to reduce pain for 3 times a week and decrease the number of cigarettes consumed after being given acupressure therapy for 1 week.

3. Result and Discussion

3.1 Assesment of the Family

The results of the study showed that Mr. S's family had a wife who suffered from hypertension. Currently Mrs. I suffered from hypertension only because of frequent headaches. Mrs. I said that she did not really understand the disease. Mrs. I said he still didn't know the treatment for the disease he was suffering from. Mrs. I said that her body often felt weak, often had headaches that radiated to her back, had dizzy eyes and felt dizzy. Mrs. I said that she picked up the medicine at the stall for headaches and the nearest Health Care Center if she was sick. Mr. S said the family's diet was not regular, they still like to eat fatty foods, and there are no restrictions in food. I myself like to eat foods that are sour, salty and spicy and fatty. Apart from that, Mr. S's family rarely did sports because he was busy working and also smoking. Mr. S said he wanted to change his family's health behavior. Mrs. I said that she wanted to recover and control her disease, and wanted to change her healthy lifestyle. This is in line with research which says that there are still 40% of people who suffer from controlled hypertension who have poor knowledge in treating hypertension [14].

The disease that happened to Mrs. I was caused by several factors, such as: genetics, age, gender, diet, and unhealthy activities. The smoking behavior of Mr. S occurred due to work factors and lack of knowledge of clean and healthy living habits. The assessment data that has been obtained are then analyzed so that it is found that there are nursing problems that are readiness to improve family coping, ineffectiveness of health care, and health behavior that tends to be at risk. In accordance with the diagnosis in Mr. S's family, the intervention carried out to treat hypertension was taking regular medication accompanied by giving young coconut water and progressive muscle relaxation therapy, as well as acupressure therapy in an effort to stop smoking in Mr. S and his child.

3.2 Reducing High Blood Pressure and the Pain

Mrs. I who suffered from high blood pressure was given a complementary theraphy by using coconut water. The result showed the decreasing of her blood pressure below:

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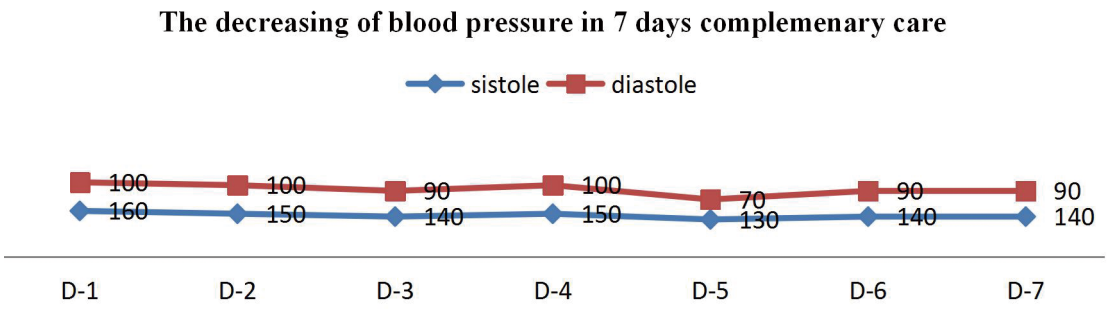

The treatment given to the problem of ineffectiveness of health care for Mrs. I in the form of complementary therapy was given by the provision of young coconut water for a week because young coconut water was very easy to get near his house. Young coconut water is a natural drink that is high in calcium, in addition to other elements such as potassium, magnesium and sodium. The potassium level in coconut water is 15 mg / 100 ml on average. With the provision of 250 cc x 3 times a day, the average consumption of additional calcium in one day is 37.5. In the act of giving coconut water / day every morning and accompanied by progressive muscle relaxation therapy for 3 times a week which has been done in order to reduce high blood pressure in Mrs. I where the blood pressure value of Mrs. I before the procedure was 160/100 mmHg and the blood pressure value was Ny. I and the final result of this implementation, precisely on the 7th day, the results obtained BP: 140/90 mmHg.

Based on the results of this study, the researcher argues that there is a great need for education and demonstration regarding the complementary therapy of young coconut water and progressive muscle relaxation therapy in the treatment of patients with hypertension. Later, the families with hypertension health problems can take the care independently at home. This is in accordance with the research conducted by Tarwoto, 2018 with the title "The Effect of Coconut Water Consumption on Blood Pressure in Hypertension Patients", where blood pressure was obtained before giving young coconut water a total of 30 respondents (100.0%) after giving young coconut water experienced drop in blood pressure becomes normal [12]

In addition, a study conducted by Rahmasari, 2015 with the title "Progressive Muscle Relaxation Can Reduce Headaches" shows the same results, namely that progressive muscle relaxation techniques are proven to provide a calming effect so as to reduce headaches, especially tension headaches. For nursing diagnoses of the ineffectiveness of health care, health education is given in the form of hypertension counseling using laptop media and leaflets. The information consist of edible and non-edible foods and the dosage of salt for people with hypertension, complications and treatment of hypertension. Some independent actions that nurses can carry out to help clients are by using Pain Management to relieve or reduce pain and increase comfort. Using therapeutic communication to find out the patient's pain experience is to use progressive muscle techniques [15].

3.3 Smoking Behaviour

For other complementary measures, namely with nursing problems, health behavior tends to be at risk where Mr. S's family said that he was smoked, lacked exercise and lacked hygiene and healthy behavior. Mr. S said that he wanted to try to reduce the number of cigarettes smoked every day. Complementary measures taken by Mr. S's family in this matter were acupressure therapy in an effort to quit smoking for 1 week. Acupressure therapy is a treatment method by providing emphasis stimulation (massage) by paying attention to the "yang" reaction, which is a reaction to strengthen energy while weakening energy is called a "yin" reaction. Acupressure therapy in this study was carried out at the LI 4 point on the back of the hand, at the LU 7 point which is located 2 fingers above the wrist, in line with the thumb of the hand, the LR 3 point on the instep where the thumb and 2nd finger meet and pressing the ear. Emphasis on the point of the body using the fingertips as much as 30 times which serves to react to strengthen "yang". Acupressure stimulates the regulatory system and activates the endocrine mechanism and the neurological system which is part of the physiological mechanism to maintain balance [16].

In the acupressure therapy action that has been carried out, it was found that the number of cigarettes smoked by Mr. S and his child before acupressure therapy was carried out was 3 packs (25 sticks). The number of cigarettes smoked after acupressure therapy for 1 week decreased to 2 packs (18 cigarettes). Based on the results of this study, the researcher argues that there is a need for education and demonstration about complementary acupressure therapy in health care, especially for family members who smoke. Later, Mr. S can later apply acupressure therapy in an effort to quit smoking. This is in accordance with

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the research conducted by Nia Nurzia with the title "The effectiveness of acupressure therapy on smoking cessation efforts", where there was a difference in the difference in the number of cigarettes consumed before and after acupressure therapy intervention was given [17].

4. Conclusion

Applying Evidence Based regarding the provision of young coconut water and progressive muscle relaxation therapy for hypertension treatment management for Mrs. I was proven to be effective in reducing Mrs. I's blood pressure. Acupressure therapy in an effort to quit smoking for Mr. S was also successful. Using the Complementary Nursing Case Study, it is hoped that can become a reference material to improve health services and provide an overview of carrying out complementary nursing care for families, especially with comprehensive hypertension cases (bio, psycho, social, spiritual). In addition, this paper can provide information to the public about independent care that can be done by families, especially complementary therapies for families with hypertension at home.

Acknowledgment

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ARTICLE

Inner Ear Disorders in the Elderly with Carotid Artery Disease Requiring Revascularization: Prevalence, Characteristics, and Association

Razan Alfakir[1,2*]

1. Department of Otolaryngology and Division of Audiology, Mayo Clinic, Jacksonville, Florida, United States
2. Department of Communication Disorders, Auburn University, Alabama, United States

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ABSTRACT

Background: Aging is almost assocaited with inner ear disorders (InEarDs) by means of age-related hearing impairment (ARHI) or vertigo-and-dizziness as well as the carotid artery disease requiring revascularization (CAD-R). **Objective:** The present study aimed to study the prevalence and characteristics of InEarDs in older adults diagnosed with CAD-R. The other aim was to determine if InEarDs in CAD-R patients is age-related or might be explained by a concomitant CAD-R. **Method:** A retrospective, case-control study was conducted at the Mayo Clinic, Florida. The study cohort includes 919 patients who had CAD-R. The control group consisted of 244 age- and gender-matched patients presenting with cardiac or peripheral artery disease. The InEarDs were assessed based on the diagnosis upon presentation to the Audiology Clinic and follow-up. **Results:** Of the 919, 348 had ARHI that includes significant peripheral signs and central symptoms (24.9%), vertigo-and-dizziness events that are recurrent and persistent with normal objective vestibular testing (12.9%), or a combination of both (11.0%). These percentages were significantly higher in the study group relative to the control group. After adjustment for the vascular risk factors, the study group had significantly higher odds of ARHI (OR= 1.94; 95% CI: 1.09-3.44; P<0.05). **Conclusion:** CAD-R patients had significantly higher InEarDs than the control group. CAD-R is more likely to be associated with ARHI rather than the vertigo-and-dizziness even after adjusting for the vascular risk factors.

1. Introduction

Atherosclerosis that predisposes carotid artery disease requiring revascularization (CAD-R) is a chronic inflammation process associated with conventional risk factors; these include age, gender, smoking, hyperlipidemia, hypertension, genetic, diabetes, and cardiovascular events [1-7]. Treatment options for CAD-R include the following: medical therapy and carotid endarterectomy (CEA), with a primary goal to prevent cerebrovascular events (strokes) or chronic cerebral hypoperfusion that increase risk of mental ill-health (e.g., dementia,

**Corresponding Author:*
Razan Alfakir,
Department of Communication Disorders, Auburn University, Alabama, United States;
Email: ralfakir69@gmail.com

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depression, cognitive impairment no dementia) [8-13].

Inner ear disorders (InEarDs) by means of age-related hearing impairment (ARHI), also known as presbycusis, and vertigo-and-dizziness are prevalent in the aging population, in which the common vascular risk factors, the associated disorders, and the cerebrovascular events chronic cerebral hypoperfusion found to play a significant role in the incidence and progression of ARHI and recurrent, persistent events of vertigo-and-dizziness [14-21].

The present study aimed to study the prevalence and characteristics of InEarDs in older adults diagnosed with CAD-R. The other aim was to determine if InEarDs in CAD-R patients is age-related or might be explained by a concomitant CAD-R.

2. Methods

2.1 Study Design

This was a retrospective, case-control cohort study conducted at the Mayo Clinic, Florida, and approved by the Institutional Review Board. The study cohort includes 919 patients who had CAD requiring revascularization. Revascularization carried out between December 1, 1995, and June 30, 2016. The control group consisted of 244 age-matched patients who diagnosed with cardiac or peripheral artery disease between January 1, 2014, and December 31, 2017. The InEarDs were assessed based on the diagnosis upon presentation to the Audiology Clinic and follow-up. The selection criteria of the patient sample and the grouping of InEarDs are listed in the Figure 1.

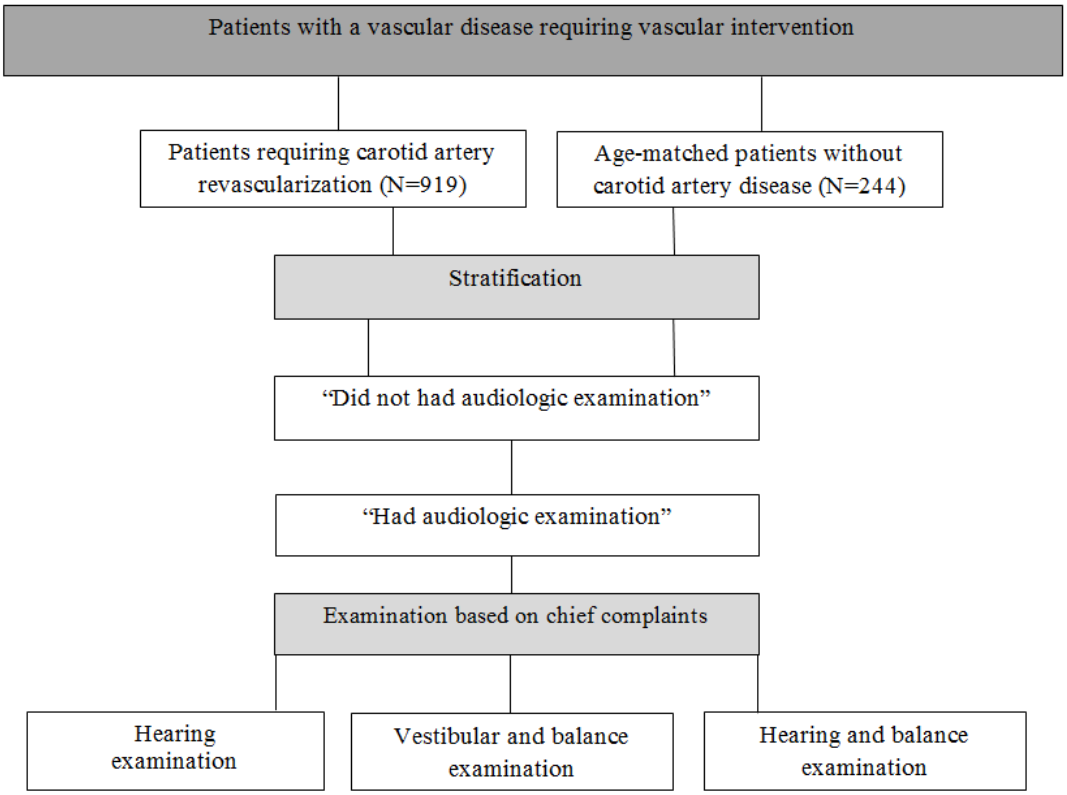

Figure 1. The selection criteria of the patient sample

2.2 Analysis of Results

All analyses were performed using SPSS version 25 (SPSS, Inc, an IBM Company, Chicago, Ilinois) and reviewed by a statistician at the Mayo Clinic, Florida. Descriptive statistics for quantitative variables are presented as prevalence. The Chi-square test was used to evaluate the preoperative characteristics difference in each group. Logistic regression was performed to assess the association of identified inner ear disorders with CAD-R.

3. Results

3.1 Demographic Data

The baseline characteristics of the study and control groups are shown in Table 1. A non- significant differences (P>.05) in age, sex, diabetes mellitus, and hypertension were noted between the two groups. Howevere, a substan-

tial difference ($P \leq .001$) in dyslipidemia and cardiovascular events were noted.

The reported degree of stenosis of the common carotid artery on the surgical site at the time of operation in the carotid group was as follows: more than 70% to 99% in 96.6%, less than 50% to 69% in 2.94%, less than 50% in 0.22%, and occluded in 0.22%. Eight hundred and eighty-eight of patients in the carotid group had carotid stenosis of more than 70% to 99% in the surgical site, based on ultrasonography and computed tomography. In comparison, 61 of patients in the carotid group had stenosis of more than 50% in the non-surgical side. All patients in the study group were under the lipid-lowering treatment, 80% under antihypertensive therapy, and 75% under antiplatelet therapy. Carotid endarterectomy with cerebral protection was the surgical procedure for all the carotid subjects.

Relative to the control group, the study group had significantly ($P<0.001$) a higher percentage of ARHI [229 (24.9%)] or recurrent, persistent vertigo-and-dizziness [119 (12.9%)] or a combination of both [100 (11.0%)]. Percentages were presented in Tables 2 and 3.

Table 1. Characteristics of Study Groups (CAD-R)

Variable	Carotid Group (n=919), No. (%)	Control Group (n=244), No. (%)	*P*-Value
Mean (SD) age, y	81.7 (8.90)	80.7 (4.72)	>.05
Sex			>.05
Male	592 (64.4)	142 (58.2)	
Female	327 (35.6)	102 (41.8)	
Degree of carotid stenosis in the surgical side, %			
<50	2 (0.22)	NA	
<50-69	27 (2.94)	NA	
≥70-99	888 (96.6)	NA	
Occluded	2 (0.22)	NA	
Degree of carotid stenosis in the non-surgical side, %			
<50	636 (69.2)	NA	
<50-69	179 (19.4)	NA	
≥70-99	61 (6.6)	NA	
Occluded	43 (4.0)	NA	
Associated risk factors and related disorders			
Hypertension	736 (80.1)	202 (82.8)	> .05
Hyperlipidemia	725 (78.9)	164 (67.2)	≤.001
Diabetes mellitus[a]	220 (23.9)	64 (26.2)	>.05
Cardiovascular [b]	249 (27.1)	89 (36.5)	≤.001

Notes:
Abbreviation: *NA, not applicable (control group did not have stenosis).*
[a] *Diabetes mellitus (type 1 or type 2).*
[b] *Cardiovascular (with remote myocardial infarction [more than 6 months], stable angina, and ejection fraction 25% to 45%).*

Table 2. Prevalence of Risk Factors of CAD-R by identified InEarDs

Variable	ARHI No. (%)	Vertigo-and-Dizziness No (%)	Combined No. (%)
Mean age, y	81.8	81.8	81.8
Sex			
Male	152 (66.3)	74 (62.2)	61 (61.0)
Female	77 (33.6)	45 (37.8)	39 (39.0)
Risk factor and related disorders			
Hypertension	191 (83.4)	92 (77.3)	80 (80.0)
Hyperlipidemia	183 (79.9)	97 (81.5)	81 (81.0)
Diabetes mellitus [a]	57 (24.9)	24 (20.2)	21 (21.0)
Cardiovascular [b]	62 (27.0)	32 (26.9)	25 (25.0)

Notes:
Abbreviation: *NA, not applicable (control group did not have stenosis).*
[a] *Diabetes mellitus (type 1 or type 2).*
[b] *Cardiovascular (with remote myocardial infarction [more than 6 months], stable angina, and ejection fraction 25% to 45%).*

Table 3. InEarDs in the Study Groups with a Degree of Carotid Stenosis in the Surgical Side

Variable	Carotid Group (n=919), No. (%)	Control Group (n=244), No. (%)	*P*-Value
ARHI	229 (24.9)	35 (14.3)	≤.001
Vertigo-and-Dizziness	119 (12.9)	12 (4.9)	≤.001
ARHI & Vertigo-and-Dizziness	100 (10.9)	6 (2.5)	≤.001

3.2 Characteristics of InEarDs

In the study group, the early- and late-onset of ARHI was seen in 54% and 45% based on the revascularization date. The onset is often described as a 'sudden onset of bilateral tinnitus followed by hearing changes' or 'gradual hearing changes.' Features of central auditory processing deficits - i.e., communicative/perceptual difficulties, environmental sound detection difficulty, sound localization difficulty, and understanding spoken speech in quiet, in noise, over distances difficulty - were evident in all patients. The magnitude of ARHI ranged from mild to severe based on the audiometric results. The audiometric profile consists of high-frequency hearing changes or high- and low-frequency hearing changes. Low-frequency dB hearing level was determined as the average decline occurred within the range of 0.25, 0.50, and 1 kHz, and high-frequency dB hearing level was defined as the average of occurred within the range 2, 4, and 8 kHz. The audiometric pattern of ARHI in the study group includes significant changes in only-high-frequency hearing or high- and low-frequency hearing [(x^2= 6.628, P ≤ 0.01)] relative to the control

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group.

Recurrent positional vertigo, persistent dizziness, imbalance and fall events with normal objective vestibular testing were the commonly observed findings in both groups. Recurrent positional vertigo defined as 'positional vertigo that was lasting more than 2 weeks and after at least 2 weeks of a symptom-free interval following previous successful treatments. Persistent defined as 'dizziness and unsteadiness that were lasting 3 months or more'. In the study group, the early- and late-onset (determined based on the revascularization date) of these findings was seen in 47% and 52%, *respectively*. A history of peripheral vestibular disorders (i.e., benign paroxysmal positional vertigo) was reported in some patients in the study group.

3.3 Logistic Regression

Logistic regression to test the clinical correlate of CAD-R with the InEarDs classified to ARHI, vertigo-and-dizziness, a combination of both was performed. The early and late-onset of HI or vertigo-and-dizziness have been merged to maintain sufficient statistical power. After adjustment for the common risk factors (age, gender, hypertension, hyperlipidemia, diabetes mellitus type 1 or type 2, and cardiovascular conditions), the study group had a significantly higher Odds of ARHI (OR= 1.94; 95% CI: 1.09-3.44; $P<0.05$). The model was statistically significant ($\beta = -2.13$; SE = .121; Wald = 312.26; $P\leq.001$). The overall logistic regression model is presented in Table 4.

Table 4. Odds Ratios in the Study Group Compared With Control Group After Adjustment for Risk Factors

CAROTID STENOSIS		
Predictor	**Odds Ratio (95% CI)**	***P*-Value**
Age	0.97 (0.94-1.00)	>.05
Sex	1.55 (0.91-2.62)	>.05
Hyperlipidemia	1.67 (0.914-3.04)	>.05
Hypertension	0.82 (0.31-0.12)	<.05
Diabetes mellitus [a]	1.56 (0.82-2.98)	>.05
Cardiovascular disease [b]	0.90 (1.09-2.96)	>.05
ARHI	1.94 (1.09-3.44)	<.05

Notes:

[a] *Diabetes mellitus (type 1 or type 2).*

[b] *Cardiovascular (with remote myocardial infarction [more than 6 months], stable angina, and ejection fraction 25% to 45%).*

4. Discussion

The present study aimed to study the prevalence and characteristics of InEarDs in older adults diagnosed with CAD-R. The other aim was to determine if InEarDs in CAD-R patients is age-related or might be explained by a concomitant CAD-R. In age-matched groups, CAD-R patients had higher percentages of ARHI, vertigo-and-dizziness, a combination of both. These percentages were significantly higher relative to the control group. Further, CAD-R is more likely to be associated with ARHI, but not vertigo-and-dizziness, even after adjusting for the common risk factors. This suggests that ARHI in CAD-R patients is not solely due to their age but might be explained by a concomitant CAD-R.

ARHI is one of the most common conditions affecting older and elderly adults. It affects about 30% of people over 65 years of age and 50% of those over 80 years of age [22]. Because of the changes in the auditory system; the early onset of ARHI is often associated with tinnitus. However, beyond the aging effects, we believe that a sudden onset of bilateral tinnitus followed by hearing changes might be related to the global decline in vascular health in CAD-R patients. In support, a study found that the presence of carotid artery plaque and a 0.2 mm difference in carotid intima-media thickness in a predominantly middle-aged cohort is associated with an increased risk of incident hearing loss (Odds Ratio was 1.18) [23]. Importantly, this difference in carotid intima-media thickness is similar to what is seen with five years of aging.

Further, peripheral signs of the ARHI include the only-high-frequency hearing loss or high- and low-frequency hearing loss. The central symptoms include communicative/perceptual difficulties, environmental sound detection difficulty, sound localization difficulty, and understanding spoken speech in quiet, in noise, over distances difficulty. Although age is the main contributory factor to the progression of ARHL and central symptoms, there is evidence that CAD can account for the abnormal audiologic findings - i.e., high-frequency hearing loss and central changes within the auditory brainstem pathways (inferior colliculus, superior Olivery nucleus, and cochlear nucleus complex) [19]. Importantly, these central changes may mimic the impact of stroke on all levels of the auditory pathway [24-27].

Several types of ARHI have been reported [28]. Sensory presbycusis refers to loss (atrophy) of the outer hair cells in the organ of Corti that produces nerve impulses in response to sound vibrations. With sensory presbycusis, which is slowly progressive and starts in mid-life, there is a sharp high-frequency sounds with relatively intact speech discrimination. Neural presbycusis, which begins early in life and effects are not noticeable until an older age, there is a disproportionately severe decrease in speech discrimination ability compared to their level

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of hearing loss. Metabolic or stria presbycusis, which tends to occur in the last two to three decades of life with a slow progressive nature, the hearing loss represented by a high- and low-frequency hearing loss (meaning the entire cochlea is affected results from atrophy of the stria vascularis.) However, speech discrimination is preserved. Accordingly, the ARHI in CAD-R patients is not solely due to their age but might be explained by a concomitant CAD-R pathology.

With regards to the recurrent positional vertigo and persistent dizziness with normal objective vestibular testing in the CAD-R pateints, this can imply a functional dizziness or space and motion discomfort, which is the is the new term for somatoform or psychogenic dizziness. This results is consisnt with a previous study showed that carotid plaque is a new risk factor for peripheral vestibular disorder [29]. The high prevelane of functional dizziness in CAD-R pateints could be related to a history of peripheral vestibular disorders (i.e., benign paroxysmal positional vertigo) as many patients may complain of residual dizziness even after successful treatment [30-32]. Also, functional dizziness could an adverse effects of CAD-R on brain functions that can impair harmony between the vestibular (balance) functions and brain area known for its role in orientation, navigation, and maintenance of postural control in space [11-13]. It is well accepted that this pathophysiologic process in dizzy pateints with vascular risk factros seem to include precipitating events that trigger anxiety-related changes in postural strategies with an increased attention to head and body motion and a cocontraction of leg muscles. Early diagnosis and management of functional dizziness, whethere it is secondary disorder after a peripheral or central changes syndrome, is very important to prevent further chronification and substantially reduce morbidity.

With that follows, the new task for the otorhinolaryngological physician and audiologists is to impart the main statements to other healthcare providers (particularly to internists of cardiovascular physicians and neurologists) and verse versa. This can be done by developing a scoring system for the association of the CAD-R with InEarDs by combining the audiological-vestibular evaluation with the vascular assessments [20-21]. Such a system is currently lacking and requires further studies to validate and implemented in clinical practice.

Limitations

Limitations of this study include its retrospective nature, for this may lead to a selection bias. Another potential limitation of this study is the use of two separate vascular patient databases with different inclusion time frames for the carotid and control groups. However, the use of a more recent database for the control group allowed for a more accurate exclusion of patients with carotid disease due to more precise imaging with more knowledge in the field, for this was our primary independent variable. The other limitation is related to the considerable number of patients who did not visit the hearing healthcare facility as compared to a number of patients who had visited the Audiology clinic. Information about the neurobehavioral assessments, including the neuroimaging in CAD-R patients, was lacking.

5. Conclusion

CAD-R patients had significantly higher InEarDs than the control group. CAD-R is more likely to be associated with ARHI rather than the vertigo-and-dizziness even after adjusting for the vascular risk factors. Developing a scoring system for the association of the CAD-R with InEarDs is the next wise step if we are aiming to improve outcomes.

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ARTICLE

Aging in the Shadow of COVID-19

Satish Kr. Gupta*

Rajiv Gandhi Institute of Petroleum Technology (RGIPT), Jais, Uttar Pradesh, 229304, India

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ABSTRACT

The coronavirus disease 2019 (COVID-19) pandemic presents a major challenge to societies all over the world. This new virus threat both socially as well as economically regarding health and safety of human being irrespective of age, race or social status across the world. This expository paper focuses on impact of COVID-19 upon elderly and importance of social distancing and isolation for elderly people. This paper also explores the scenario of COVID-19 in India and the measures that government bodies are taking to contain and mitigate it. Role and responsibilities of families and caregivers to keep away the elderly disease-free, spirited and mentally fit. Those in isolation or quarantine need special care: telephonic counselling, digital contact with family and ensuring adequate nutrition is vital. The study is primarily based on secondary data including books, journals, newspapers, and other governmental reports.

1. Introduction

The coronavirus disease 2019 (COVID-19) pandemic presents a major challenge to societies all over the world. It's a new disease, and we learn more about it every day. COVID-19 effects our daily life and the experiences of the people around us. Every aspect of our life has changed over the last seven months and we have a great deal of learning about the disease. This new virus threat both socially as well as economically regarding health and safety of human being irrespective of age, race or social status across the world. This disease was detected on 31 December 2019 and on 12 March 2020 the WHO categorized it as a pandemic disease [23]. The illness is associated with common symptoms of dry cough, flu, fever and breathing difficulties [23]. Normally, this virus enters the body through the mouth, nose, and eyes [19]. This virus spread in universal form, it does not recognize any caste, sex, age, and religion. We are divided by religion, region, caste, colour and ethnicity but this virus differentiate only rich and poor. On the one hand, the wealthy who lock their doors and leave the rest of the world outside, and on the other, the needy who have no choice but to go outside and struggle for everyday needs. This current pandemic brought inequality to the surface of society such as migrant labour, homelessness, people of slum area, refugees etc. are facing additional challenges in this lethality situation. Low wage workers, homeless people, elderly and disabled have been disproportionately affected by this virus. The COVID-19 compelled a lot of migrant workers to go home because they came without family and had no permanent residency. That led to sudden, and very high, increases in unemployment. People inside their homes in this deadly scenario, because nothing is more valuable than one's life. Government initiatives and strategies have been formulated in order to slow the spread of the

**Corresponding Author:*
Satish Kr. Gupta,
Rajiv Gandhi Institute of Petroleum Technology (RGIPT), Jais, Uttar Pradesh, 229304, India;
Email: satishgupta229@gmail.com/pso17002@rgipt.ac.in

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COVID-19 pandemic and to reduce the anticipated negative health and socio-economic impacts.

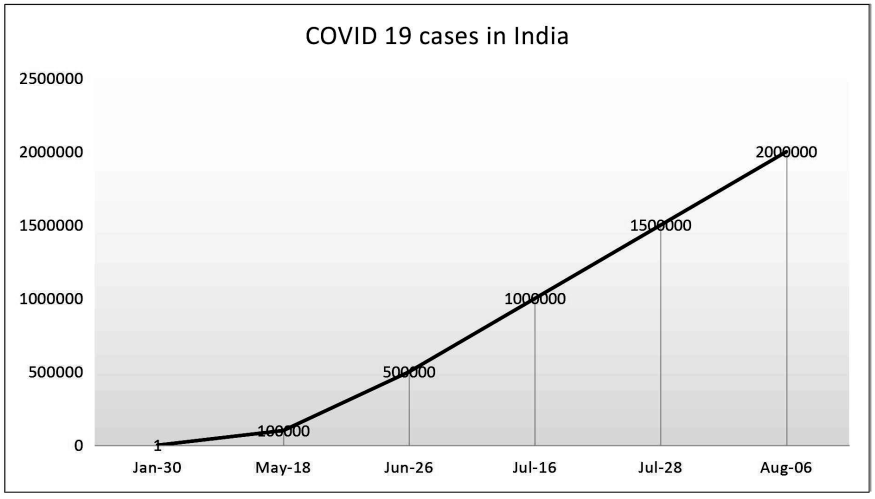
This virus is very similar to Pen drive. As pen drive contains enormous data for storage, transfer, copying and visualisation [16]. Mitra also describes that mechanism for data transfer with this virus is required like a pen drive. Beck [3], defines that risk society as a systematic way of dealing with hazards and insecurities induced and introduced by modernization itself. Beck also explains that the reflexive modernization, where unintended and unforeseen side-effects of modern life backfire on modernity.

The Indian scenario is completely different from the world, because it has a high population density. India's major challenges of maintaining physical distance in households with limited space and its worst in the slum area where there is very high population density with unhygienic. In India everything has changed, including social structures, families, kinship, faith, culture, etc. A new culture developed as well where we may see a Shift from handshakes/hugs to virtual hugs/hellos. The pattern of interaction is totally changed, instead of shaking hand people following no hugging, no touching and maintained six feet distance. With this new social order in everyday life, people are bound together in terms of social distancing and physical distancing by a new act of collective solidarity.

It is an opportunity for people to spend more time with their family, simplify their lives, engage in hobbies, and watching T.V. shows, go ahead with the work, etc. This pandemic has transformed the online lives of young people into family life. They are spending their time with their family which has brought back the traditional family's age-old ethos. The various step of lockdown tremendous increase in family interaction. The homes in which we live have become our complete world. Perhaps one of the most prominent changes it has brought data and graph have replaced with meme and images in our WhatsApp and other social sites.

2. COVID-19 Background in India

India reported the first COVID-19 case at Kerala on 30 January. With each passing day, the number of COVID-19 cases in the country continues to increase with India recording the highest single-day spike of almost 61,996 cases over in a span of 24 hours. The COVID-19 disease crosses over 19 million worldwide, with most cases contributing from the United States, Brazil, India, Russia and South Africa. After the United States and Brazil, India became the third country in the world to report more than 2 million cases of coronavirus disease on 06/08/2020, in just 190 days from the start of the country's outbreak (The Hindu). More than 48% of all cases in India can be traced to just three states - Maharashtra, Delhi and Tamil Nadu (Hindustan Times). The Health Ministry of India [15] advised people to wash their hand and face regular interval with soap, stay at home, avoid meetings and public gathering, and maintain of at least one meter.



Source: https://indianexpress.com, 2020.

With a total 61,996 cases in a single day taking the national tally to 20,22,730 COVID-19 cases in India. While the first 100,000 cases occur in 78 days and the second 100,000 cases comes in only 15 days, this disease subsequently rises very rapidly and in just 190 days crossed a figure of 2 million. In the figure above, we can see that the first 100,000 cases took 78 days and the second 100,000 cases took 15 days, and the third 100,000 lakh case came in just 10 days. We can see in the above figure that the number of infected people increases day by day. Per 5 million positive cases increases with the minimum number of days, like the first 5 million cases in 110 days and

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last in only 9 days.

3. COVID-19's Impact on Society

COVID-19 infected countries have banned attending classes in schools, colleges, and the universities and they are using online mode for providing education, but millions of students are not getting a good quality of education. This idea is not well successful because poor people's children are unable to attend classes online. Children of low-income families face many problems in online schooling such as non-availability of smartphone, reliable internet, etc. Students of northeast India facing the problem of the low signal mobile network problem. Students roaming with their mobile phone in hope for their mobile phone handsets to come alive or catch the signal [13].

COVID-19 affected mostly the vulnerable section of society. In the slum areas, people home is not a safe and comfortable place to be. Like Mumbai and other cities poor people living cramped, low quality, uncomfortable. In this pandemic situation, self-quarantine in slum dwelling areas is impossible because in slum areas there are at least 4-5 persons living in one room. Also the multigenerational household is common among poor and slum dwellers.

Recently the movie Gulabo-Sitabo released on Amazon Prime because of COVID-19. The film industry directly and indirectly provides employment for millions of people. This trend of releasing films on digital platforms may lead to unemployment for many of them and most hit the lower and middle-income groups. The film industry is not only limited to Mumbai city, but also contributes to the country's economy.

In older people the COVID-19 risk is greater. In this situation of lethality, weakness, low immunity and illness all these factors influence the elderly people. Most of us are worried about our older loved ones, who live far from us. Elderly people may face anxiety and depression because of the fixed income or pension. They cannot use public transport for their routine health check-ups.

4. Impact of COVID-19 upon Elderly People

COVID-19 risks aggravating the social exclusion of older persons through measures to restrict movement and contact such as stay-at-home restrictions, quarantines, and lockdowns. COVID-19 has impacted the lives of older persons in many fundamental ways, the most important being income, health, mobility and social isolation. As we age, our state of health becomes weak day by day. In our old age we are getting the various disease like heart disease, cancers, and metabolic and low immunity. Senior citizens face the fatal effects of COVID-19 because one's immune system weakens with age. Because of the low immune power mortality rate among the elderly is more than younger through COVID-19. It is reported that older adults constitute a higher percentage of confirmed COVID-19 cases and deaths. Senior citizen accounts for 63% of the death that has occurred due to the COVID-19 in India [14]. The mortality risk among elderly people is 3.6% in their 60s, which increases to 8.0% in their 70s and 14.8% for people in 80s and over [17]. Fatality rate from COVID-19 rises sharply with age [5]. Due to COVID-19, elderly people can't spend their time with their friends and family members. Conditions of the elderly are vulnerable to the infection, these high-risk categories of people should be given extra care [15].

Age	Share in total population	% Share in all COVID-19 deaths	
		Up to May 21	Up to July 9
<=14 years	35%	0.5	1
15-29	18%	2.5	3
30-44	22%	11.4	11
45-59	15%	35.1	32
60-74	8%	40.2	39
>=75	2%	10.3	14

Source: *Times of India, 2020.*

In the figure above, we can see that the elderly population over 50 years of age is at severe risk for the disease. People aged over 45, who contribute 25 percent of the country's population, account for 85 percent of COVID-19 death in India. Individual between the ages of 60 and 74 years are only 8% of the population, but their fatality rate is 39%. Those older than 75 years are 2% of the population that account for 14% of total COVID-19 death. For those who are old it is disproportionately fatal.

5. Impact of Physical/Social Distancing on Elderly

In the absence of vaccine, social distancing is the most effective strategy for its minimising and control. It is the most important way to surviving in this lethality situation. Isolate people across a region to limit infections on a daily basis or new ones. Social distance refers to a sense of familiarity (nearness and intimacy) or unfamiliarity (farness and difference) between themselves and people belonging to different social, ethnic, occupational, and religious groups from their own [6]. People in diverse society experience connection and solidarity in some situation and distance and alienation in other situation [6]. Bogardus [4],

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created social distance scale for measure people's willingness to participate in social contacts of varying degrees of closeness with members of diverse social groups, such as racial and ethnic groups.

It is like a tuff task for the poorest, most vulnerable, and marginalised member of our society. Keeping distancing is often impossible, whether in office or bus stop, at the grocery or in a taxi, buying vegetables from street vendors. Lots of people working from home but others people like labour, restaurants, salons etc. theses can't work from home and can't work remotely. The following people can't afford to stay home because they suffer a crippling loss of income. They have no alternative except to go back to work. They bear the risk and face it in the hope it won't happen to them.

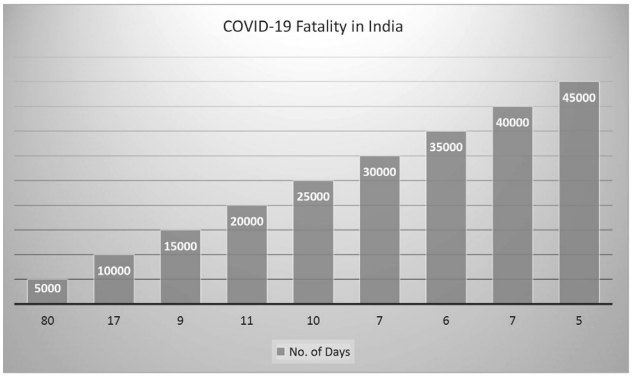
6. The Consequence of Isolating the Elderly

The COVID-19 pandemic has suddenly brought fear and uncertainty, especially among older adults. Elders are more vulnerable to death from the virus compared with younger people. Because of this disease elderly population go for self-isolate for a very long time in all over the world. Social isolation includes avoiding social contact with friends and family members. Isolation or loneliness is a real risk factor for all people's health and well-being but older people are more vulnerable to loneliness. Older adults are contributing continuously and actively to society through paid and unpaid work. Physical distance is the most important tool to reduce the spread of this disease. Isolating the elderly might reduce transmission of the disease, which result in low patient and low risk among elderly. Social isolation and loneliness are related but both are different concepts. Social isolation refers to a lack of contact with or physical separation from family, friends, or broader social networks and the lack of involvement in social activities [20]. Loneliness is complex, emotional, feeling of anxiety and dissatisfaction associated with a lack of connectedness with others and a deficit of social engagement [22].

Coping with social isolation depends on the various factors such as social support availability, household size, urban or rural location, technology availability, and even psychological and regular lifestyle factors. The elderly people whose social contact is out of the home, they are very anxious about the self-isolation. Social capital can be decline with ageing, due deteriorating health, death of partners and friends, so older people may have fewer closer relationships and may be more likely to live alone [21]. With the lockdown and social distancing, seniors feel more alone than usual. Various stage of lockdown has brought up anxiety and fears of dying alone among the elderly. Those who have no close family or friends and rely on the support of voluntary services or social care, they are at additional risk, along with those who are already lonely, isolated, or secluded. Social isolation among older adults is a serious concern because of their greater risk of cardiovascular, autoimmune, neurocognitive, and mental health problems (Emerson & Jayawardhana, 2015). Santini and colleagues [18], explain that social disconnection puts older adults at greater risk of depression and anxiety. Social distancing doesn't mean isolation or loneliness. We need to keep older adults safe, but also keep in mind that social isolation can have a negative impact on older people's immunity and mental health [1]. Social isolation and loneliness increase the risk of anxiety, depression, cognitive dysfunction, heart disease and mortality among elderly people [2].

7. COVID-19 Fatality of India

The total number of people who died in India as a result of COVID-19 disease has gone beyond 45,000, giving India a death rate of 2.07 per cent, meaning that on average 207 people had died out of every 10,000 detected with the disease. This is significantly lower than the global death rate, which currently stands at 3.8 per cent. According to the global database of World Health Organisation, nearly 7 lakh people out of the 1.83 crores (18.3 million) that were detected with the disease have died. The maximum deaths happened in the United States, where more than 150,000 people died. In the United States, the death rate is slightly more than 3.3 per cent (The Indian Express, 2020).



Source: *Worldometers*

In the figure above we can see that the maximum number of COVID-19 fatality with the minimum number of days. . It took 80 days for the first 5000 deaths, and 17 days for the second 5000 cases. The fatality rate subsequently rises sharply, reaching 40,000 to 45,000 deaths in just five days.

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8. Conclusion

In terms of the spread of coronavirus disease things are getting worse around the world. The collective efforts of the public and government are sorely needed. It is urgently advised and requested that all the persons follow strictly without any discrepancy the preventive measures, managements and quarantine otherwise the situation may be the worst. Through this pandemic unemployment ratio on the peak, this will lead to increase in suicide, substance abuse, domestic violence, homelessness and food insecurity. Digital technology devices will and can provide a basis for maintaining social connections with friends, family, social networks and/or the wider community. We need to understand much more about the intermediaries that were crucial to efforts to mitigate costs like the social worker, police, doctors, nurses, sweepers who creatively risked their own health to provide services to the needy. Limiting in-person visits is one important way of reducing the risk of your older family members catching COVID-19. Families and caregivers can use some of these ways to keep the elderly disease-free, spirited and mentally fit: 'Physical distancing' rather than 'social distancing': Regular telephonic contact with them to ensure adequate emotional support. Their daily needs and living requirements need to be optimised. Considering their vulnerability, it is better to avoid going out or meeting too many people. Those in isolation or quarantine need special care: telephonic counselling, digital contact with family and ensuring adequate nutrition is vital. The hand cleaning with soap and sanitizer, mouth and nose coverage with mask during sneezing and coughing are essential.

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ARTICLE

Effects of Mirror Therapy on the upper Limb Functionality: A study on the perception of Occupational Therapists

António Arsénio Duarte[1*] Ana Paula Martins[1] Djanira Gomes[2] João Fragoso[2] Joyce Amado[2] Pedro Rosa[2]

1. Teachers of the Beja Polytechnic Institute, Portugal
2. Graduating Students of the Degree in Occupational Therapy of Beja Polytechnic Institute, Portugal

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ABSTRACT

With the visual illusion of the mirror, Mirror Therapy, models the primary somatosensory cortex, cortical and muscular excitability, stimulating cortical reorganization and sensorimotor recovery. Studies have shown to be effective in improving motor function in short and medium term, in activities of daily living, in visuospatial neglect and in reducing pain, especially in patients with complex regional pain syndrome. Objective: To report the perception of Occupational Therapists regarding the application of Mirror Therapy in professional practice. Specifically, what factors lead to its application, what are the effects and benefits of the technique, what are its advantages and limitations. Results: In the perception of Occupational Therapists, the Mirror Therapy technique has the following benefits: significant decrease in pain, improved sensitivity and functionality of the upper limb, unblocking movements in the affected limb, decreased phantom pain; as negative aspects: difficulties in spatial / environmental control, patient's perceptual / cognitive skills, high level of concentration / attention, absence of scientific evidence in neurological conditions. Conclusion: For the interviewed Occupational Therapists, the Mirror Therapy is a safe and useful technique to be applied in your professional practice that has been showing positive results in the functional recovery of patients, however, it lacks studies that identify the appropriate time to start its application and the explanation of an intervention protocol.

1. Introduction

Mirror therapy is a therapeutic intervention aimed at improving the functional movements of paretic limbs [1] that frequently causes problems with activities of daily living (ADL) such as walking, dressing or eating. It's a rehabilitation therapy in which a mirror is placed on the person's median sagittal plane, in order to reflect the image of a limb's movements without any problems, giving the illusion that the affected limb has a normal movement [2]. Visual illusions make the patients feel as if their two hands are moving simultaneously and symmetrically. The visual illusions are activated in the cerebral hemispheres, and this activation functions as the basis of a neurological mechanism for inducing brain

**Corresponding Author:*
António Arsénio Duarte,
Teachers of the Beja Polytechnic Institute, Portugal;
Email: ajaduarte@gmail.com

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plasticity [3].

Behind this mechanism are the mirror neurons. Mirror neurons are a class of neurons, originally discovered in the premotor cortex of monkeys, that discharge both when individuals perform a given motor act and when they observe others perform that same motor act. Ample evidence demonstrates the existence of a cortical network with the properties of mirror neurons (mirror system) in humans. This system is composed of nerve cells with visual motor properties located in the premotor cortex, primary somatosensory cortex and the lower parietal cortex. This particular type of neuron is activated during movements, by passive observation or imagination of a given action [3,4]. The human mirror system is involved in understanding others' actions and their intentions behind them and it underlies mechanisms of observational learning [4], however, these mirror neurons are only activated if you watch an action that you can perform yourself [3,4].

Mirror therapy was first introduced in the treatment of limb-amputated patients with phantom limb pain, and resultant reductions in pain were reported [5,6]. Studies carried out with patients with chronic stroke patients demonstrated an improvement in the function of the upper limbs and the accuracy and speed of movement [7-9]. Likewise, mirror therapy, when applied for 4 weeks in patients with acute stroke, improve their upper-extremity motor recovery and independent activity scores [10], as well as their lower-extremity motor recovery and motor function [11]. Ramachandran, in 1995 and 1996, had also applied it in reducing pain in patients who reported phantom pain [4,6]. In short, there are several studies [10,12-15] that show that the Mirror Therapy combined with bilateral training of the upper limb, increases the feedback of visual or mental images, facilitating the motor function of the more affected upper limb, as well as sensory recovery, the quality of life, the performance of tasks in the ADL's, the level of independence, the increase of the activity of the motor cortex in cerebrovacular lesions and also the reduction of phantom pain. In short, if studies have shown that task-oriented training tends to improve the functions of the upper extremity, but mostly in terms of balance with other body parts and balance while walking. Others have claimed that such training also helps patients take care of themselves.

The aim of this study was to analyze the perception of Portuguese Occupational Therapists regarding the application of Mirror Therapy in their practice. This study is justified by the lack of scientific evidence on the effectiveness of this technique, especially on the procedures for its application and the ideal time to start the intervention. It's also important to identify the view of Occupational Therapists, on the advantages and disadvantages of its application, as well as the population that most benefits from this technique and at what levels.

2. Methods

This investigation is in fact a descriptive study that will explore a qualitative approach, carried out with nine Portuguese Occupational Therapists specialized in different areas of of intervention (six are female and three are male; aged between 26 and 59 years). The data collection was made using a interview guide and a sociodemographic questionnaire. Data were analyzed using the content analysis technique [16], in an analytic-descriptive perspective. This method proves to be the most appropriate, given that it allows to verify the meaning of the participants' experience, always having a phenomenological approach to the rear.

As previously mentioned, we sought to expand and deepen and capture the experiential universe of the participants. For this, we used a semi-structured exploratory interview (oral and with audio recording for the purpose of later transcription and analysis), guided by an interview guide, previously built according to the objectives that guide this investigation. The order of approach of the different themes did not follow a rigid sequence, allowing itself to be dictated by the concerns, emphases and associations of thought of the Occupational Therapists. Throughout the interviews, according to their evolution and the interviewee, there was a need in some of them to introduce and / or eliminate some questions.

All participants provided written informed consent.

3. Results

The objective of the investigation was to obtain answers of Mirror Therapy usages for rehabilitation and re-education of the upper limb, applied to the clinical practice of Occupational Therapy, through the exploration of the professional experiences of the interviewees. It was found that all participants use or had used Mirror Therapy, and two of the nine participants received specific training on the technique through workshops or postgraduate studies.

It should be noted that all respondents had carried out bibliographic research on the technique, looking for scientific evidence about its practical application, its benefits, contraindications, target population and application procedures. All participants reported that they used Mirror Therapy in conjunction with other therapeutic techniques, namely, passive and / or active segment mobilization, electro-stimulation and PANat (with or without Margareth Johnstone's splints) in their therapeutic interventions, especially in individuals who suffered stroke or phan-

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tom pain. With regard to the procedure for applying the technique, this is not consensus among the Occupational Therapists interviewed, varying from when its application begins and the preparatory methods they use in conjunction with it.

As main positive aspects, the interviewees referred, mainly, that the application of Mirror Therapy promotes motor and functional improvement, which promotes greater motivation and involvement of the patient in the rehabilitation process.

As less positive aspects, the interviewees point to limitations of its application, namely the demanding cognitive skills necessary to understand what is explained and requested during the application of the technique.

4. Discussion

All participants reported using Mirror Therapy in conjunction with other therapeutic techniques, particularly in amputees with phantom pain and stroke patients. There is also a total agreement of the interviewees as to the fact that this technique is simple to apply and the mirror is an intervention instrument that is easy to reproduce.

According to the interviewees, Mirror Terapy, when accompanied by a conventional rehabilitation program, provides better benefits, namely in terms of sensorimotor recovery, enhancing the functionality of the upper limb [2,14]. Some Occupational Therapists also report that the application of this technique promotes pain reduction, improves performance in activities of daily life and corrects the neglect resulting from a stroke [2,6].

Although the procedures for applying the technique are not consensual, all participants use the same type of material and the same positioning as the patient. They use a mirror (35x35cm) placed vertically, placing the hand on the affected side of the patient behind the mirror and the unaffected hand in front of the mirror [4].

Respondents reported that attention and concentration skills are necessary and essential to perform the technique correctly. They also mentioned the need to perform it in a calm and controlled environment - which is not always possible to control, depending on the clinical context. It's necessary to maintain concentration throughout the period in which the activity is carried out in order to obtain effective functional gains. The more complex the movement sequences are, the more attention and cognitive effort is required from the patient, so, to obtain good results, it's essential that these skills are integrated [5,6,10,12].

5. Conclusion

Occupational Therapists consider mirror therapy to be a low-cost technique, safe and easy to administer. They ensure that contraindications and side effects are few. These characteristics make mirror therapy a potential treatment option for pain control, sensorimotor re-education and the performance of activities of daily living, enhancing functional capacity. They also consider that it's a very effective technique in reducing phantom pain.

As for the application procedure, it's not consensual among the interviewees, either with regard to the beginning of its application or with regard to supporting therapy. However, everyone considers that this technique, when applied in conjunction with other therapeutic methods, is substantially more effective.

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ARTICLE

In-Home Drug Storage by Older Adults

Lori Suet Hang Lo* **Linda Yin King Lee** **Irene Yuen Fung Wong** **Yuen Yan Lai** **Hoi Tong Au** **Tsz Ying Wong** **Chui Ping Chueng** **Wai Lam Shek** **Choi Yi Wong** **Hoi Lam Chan** **Hon Sze Cheuk** **Nga Hing Mark** **Shu Ching Wong** **Wing Yan Cheung**

The Open University of Hong Kong, Hong Kong, China

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ABSTRACT

Globally, in-home drug-storage compliance is often unsatisfactory, especially among older adults, and can lead to negative health outcomes. This study used a cross-sectional and descriptive design to examine in-home drug-storage compliance among older adults. Convenience sampling was used to recruit 117 older adults in Hong Kong. An in-home drug-storage checklist was used to assess the in-home drug-storage environments (light, temperature, and humidity) and drug-storage methods (drug safety, packaging, information, and expiration) of each older adult. The findings showed that Hong Kong older adults' overall compliance rate in drug storage was 87.25%, and their compliance rate for drug-storage methods (84.59%) was lower than that for drug-storage environments (97.02%). Older adults who were of advanced age, who were less educated or who lived alone demonstrated lower in-home drug-storage compliance. This indicates the need to revise existing health-education strategies to encourage in-home drug-storage compliance. Healthcare professionals should assess older adults' drug-storage compliance to identify less compliant subgroups and deliver specific drug-storage support as required. Family members should also be involved in this process.

1. Introduction

In-home drug storage is a common practice around the world [11,14,21,23,27,31]. In Hong Kong, three-quarters of the population store drugs at home [4]. In-home drugs are prescribed by physicians or purchased from dispensaries [30], and typically include analgesics, antibiotics, and cold remedies [1,17]. People often store drugs for continuous use and may keep discontinued drugs at home for emergency use [4]. Older adults are subject to risks from polypharmacy and multiple co-morbidities, and are also at risk of suffering from adverse drug reactions as result of taking drugs that have been improperly stored at home [11,14]. Currently, the global population is aging; the number of people aged 65 or more is projected to rise from 703 million in 2019 to 1.5 billion in 2050 [32]. Thus, older adults' in-home drug-storage compliance will be of increasing significance.

Improper in-home drug-storage has many negative

**Corresponding Author:*
Lori Suet Hang Lo,
The Open University of Hong Kong, Hong Kong, China;
ORCID ID: https://orcid.org/0000-0002-2141-8778
Email: shlo@ouhk.edu.hk

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consequences [8,10], such as the risk of poisoning. Good drug-storage has two components: a proper drug-storage environment and a proper drug-storage method. Proper in-home drug-storage environment has appropriate levels of light, temperature, and humidity, as these factors can influence drug safety and effectiveness [7,17,37]. Proper in-home drug-storage methods involve storing drugs in a safe place, keeping the original packaging and drug information, and discarding expired drugs [10,18]. Improper drug-storage methods include putting drugs in the wrong packaging or keeping expired drugs, which can result in accidental poisoning and toxicity. Ultimately, improper drug-storage practice threatens patient safety, and may increase healthcare costs [13,16]. Similarly, it has also been noted that improperly stored drugs harm the health of users [11,14,17]. Therefore, complying with in-home drug-storage standards is crucial [18].

Although studies have highlighted the importance of proper in-home drug storage, they have found that compliance is often poor. Studies have found that only half of older adults, for instance, complied with in-home drug-storage standards in the Netherlands (51.2%) and Nepal (51.3%) [27,33]. More than half of adults in United Kingdom (63.8%) and Brazil (52.9%) stored drugs in the kitchen, where the temperature is unsuitably high [22,26]; another study found that many adults in Qatar kept drugs in the bathroom (19%), which is unsuitably humid [13]. Adults appear to be best at complying with appropriate light conditions for drug storage, by keeping drugs away from sunlight (89.1%) [22]. However, another study found that approximately three quarters (76.4%) of older adults consistently stored drugs in the proper environment, in terms of temperature, light and humidity [34]. Vlieland found that older adults correctly stored less than half (46.8%) of drugs that required refrigeration but did not investigate their drug-storage practices with respect to light and humidity [34]. There is an incomplete understanding of older adults' drug-storage environment practice.

With respect to older adults' drug-storage methods, 90.6% of older adults in the Netherlands stored unexpired drugs at home [34], and this figure was even higher in Nepal (99.5%) [27]. Vlieland found that most older adults kept the intact primary packaging (95.3%), stored drugs with their leaflets or instructions (71.2%) and kept drugs labels intact for drug identification (97.1%) [34]. The reasons for these practices are still unknown as they have not been discussed in previous studies. In addition, another study showed that only one quarter of adults kept drugs away from children [22]; however, this practice has not been explored among older adults. Knowledge of older adults' in-home drug-storage practice remains incomplete.

Studies have suggested that in-home drug-storage practice is related to personal characteristics. Educational level is positively correlated with drug-storage compliance; the prevalence of keeping expired drugs at home is four times higher in households with the lowest levels of education than in households with university-educated members [17]. However, another study found that even those with a graduate level of education often failed to comply with drug-storage standards [27]. Gender is associated with drug-storage compliance: Brazilian women are more likely to comply with drug-storage standards than men [22], whereas another study found that Chinese women had poor drug-storage practices[20]. Living with children is associated with higher drug-storage compliance, as households are more concerned to hide drugs from children [22]. One study highlighted that older adults living alone had particular difficulties with drug-storage problems due to a lack of social and family supports [20]. These previous findings regarding the associations between personal characteristics and drug-storage compliance remain incomplete, particularly for older adults.

Most of the literature has focused on adults; studies that focus specifically on older adults' in-home drug-storage are rare. Previous studies have also focused on different cultural backgrounds, generating inconsistent findings, and current knowledge is inadequate for explaining local contexts. This study therefore attempted to address the current insufficient understanding of in-home drug-storage compliance among older adults. We assessed the compliance rate in terms of the drug-storage environment and drug-storage methods, compared the differences in compliance rates between older adults with different personal characteristics and examined the correlation between compliance rates and different personal characteristics.

2. Methods

2.1 Design, Setting, and Sample

Our research adopted a cross-sectional and descriptive approach. It was conducted in Hong Kong. Convenience sampling was used to recruit participants through the researchers' social networks. The criteria for selection were that subjects must (1) be aged 65 or above, (2) self-manage in-home oral drugs, (3) have normal cognitive function and have passed the Mini-mental State Examination (MMSE), and (4) understand and speak Cantonese (a common dialect in Hong Kong). Subjects who (1) lived in a hospital, residential care home, or outdoors, or (2) suffered from psychiatric or neurological disorders were excluded from this study.

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2.2 Measures

An in-home drug-storage checklist was used to measure in-home drug-storage compliance. The checklist was developed on the basis of international guidelines on drug storage [10,18], and the items were conceptualized and categorized into groups. The checklist comprised 17 items in two parts. Part one measured the drug-storage environment, with respect to light (1 item), temperature (1 item), and humidity (1 item), while part two measured drug-storage methods, with respect to drug safety (3 items), drug packaging (4 items), drug information (2 items), and expiration of drugs (2 items). The content validity of the checklist was assured by conducting an expert review. A panel of four experts, consisting of one pharmacist, one community nurse and two academics in nursing research, was invited to assess the content validity. The finalized checklist obtained a Content Validity Index (CVI) of 0.94, suggesting high validity [25]. Inter-rater reliability was estimated by Krippendorff's alpha coefficient, which had a value of 1.0, indicating the highest level of agreement [15]. The total number of drugs stored and the number of drugs stored properly were recorded. Each item was then rated by calculating the compliance rate in terms of the percentage of drugs stored properly (the number of drugs stored properly divided by the total number of drugs stored). Compliance rates for each subscale (drug-storage environment and method) and overall compliance were calculated.

2.3 Data Collection Procedure

Home visits were conducted from December 2019 to January 2020. Researchers explained the purpose and procedures of the study to the participants and obtained their consent prior to data collection. Data on individual characteristics, comprising age, gender, educational level, living status, financial status and utilization of community health care services and community centers were collected. Researchers used the in-home drug-storage checklist to assess compliance with in-home drug storage standards. The compliance rates for individual items, subscales and overall performance were then calculated by the researchers.

2.4 Data Analysis

The Statistical Package for the Social Sciences version 22 was used for data analysis. Descriptive statistics were obtained using frequencies and percentages for categorical variables (gender, living status, receiving community healthcare services and visiting community centers) and ordinal variables (educational level and financial status); the mean, range, standard deviation, and scores were used for continuous variables (age, overall compliance rate and compliance rates for drug-storage environment and method).

Non-parametric statistics were used because the sample was not normally distributed. Spearman's rho test was conducted to examine the correlation between an individual's personal characteristics (age, educational level and financial status) and compliance rate (drug-storage environment, drug-storage method, and both). The Mann-Whitney U test was used to assess differences in compliance rates (drug-storage environment, drug-storage methods, and overall drug storage) between older adults in different groups (gender, living status, receiving community healthcare services and visiting community centers). A p value of <0.05 was considered statistically significant.

2.5 Ethical Considerations

Ethical approval was obtained from the Research Ethics Committee of The Open University of Hong Kong prior to data collection. Each participant was given an information sheet explaining the purpose of study. All of the participants were voluntary and anonymous. Consent was obtained from each participant. Information collected from this study was used exclusively for the purposes of this study. All data were kept confidential and secure. Personal information was disposed of by shredding documents and deleting the digital data after completion of the study.

3. Results

3.1 Participants' Characteristics

Table 1 displays the personal characteristics of the participants. A total of 117 participants were recruited and their average age was 72.6 [standard deviation (SD) = 7.2]. More than half were female (55.6%). Almost half (46.2%) had received primary education. Over two thirds (76.9%) were living with others. More than four-fifths earned less than HK$8,000 per month (82.1%). Most did not receive community healthcare services (93.2%) and did not visit community centers (81.2%).

Table 1. Personal characteristics of participants (N = 117)

Personal characteristics		*M* ± *SD* (Range)	n (%)
Age		72.6 ± 7.2 (65-93)	
	65-74		82 (70.1)
	75-84		21 (17.9)
	85+		14 (12.0)
Gender	Male		52 (44.4)
	Female		65 (55.6)
Educational level	Below primary		30 (25.6)
	Primary		54 (46.2)
	Above primary		33 (28.2)

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Living Status	Alone	27 (23.1)
	Living with others	90 (76.9)
Financial status (Monthly income in HKD)	< $4,000	49 (41.9)
	$4,000-$7,999	47 (40.2)
	$8,000-$11,999	11 (9.4)
	≥$12,000	10 (8.5)
Receiving community healthcare services	Yes	8 (6.8)
	No	109 (93.2)
Visiting community centers	Yes	22 (18.8)
	No	95 (81.2)

3.2 Compliance Rates for Drug-storage Environment and Drug-storage Methods

The mean overall compliance rate for drug storage was 87.25%. The mean compliance rate for drug-storage environment (97.02%) was higher than that for drug-storage methods (84.59%) (Table 2). For drug-storage environment, mean compliance rates were similarly high for keeping drugs away from sunlight (99.48% ± 2.47%), at the recommended temperature (92.53% ± 24.49%), and in a dry environment (99.06% ± 9.28%). The compliance rate for keeping drugs at the recommended temperature ranged from 0% to 100%, and was highly dispersed with the largest SD (= 24.49), compared to that for protecting drugs from sunlight (SD = 2.47) and from humidity (SD = 9.28). Another dimension was compliance with drug-storage methods, i.e, drug safety, drug package, drug information and expiration of drugs. In terms of drug safety, the mean compliance rate was relatively high for storing drugs individually (94.00% ± 18.56%), but was lower for separating drugs from food (87.52% ± 31.84%) and for keeping drugs in a locked cabinet and out of reach of children (58.14% ± 48.26%). For drug packaging, mean compliance rates were as follows: storing drugs in intact packaging (95.12% ± 12.32%), storing drugs in sealed or zipped packages (89.09% ± 23.34%), storing drugs in primary packaging (85.08% ± 25.16%), and storing drugs with leaflets or instructions (80.89% ± 26.94%). For drug information, the mean compliance rate for storing drugs with labels present (86.79% ± 23.82%) was slightly higher than that for storing drugs with labels having clear information of the drug name, dosage, frequency, expiry date and patient name (81.42% ± 27.07%). For expiration of drugs, the mean compliance rate for storing drugs with identifiable expiry dates (92.13% ± 16.96%) was considerably higher than that for keeping unexpired drugs (80.28% ± 21.74%).

Table 2. Compliance rates for drug-storage environment and methods (N = 117)

Items	Compliance rate			
	Mean	SD	Range	
			Minimum	Maximum
Drug-storage environment				
Light				
1.1 Drugs were stored away from direct sunlight	99.48	2.47	80.00	100.00
Temperature				
2.1 Drugs were stored at room temperature (15-25 °C) or refrigerated (2-8 °C)	92.53	24.49	0.00	100.00
Humidity				
3.1 Drugs were kept in a dry environment with humidity less than 65%	99.06	9.28	0.00	100.00
Subscale for drug-storage environment	*97.02*	*8.85*	*60.00*	*100.00*
Drug-storage methods				
Drug safety				
4.1 Drugs were kept in a locked cabinet and out of reach of children	58.14	48.26	0.00	100.00
4.2 Drugs were stored individually	94.00	18.56	0.00	100.00
4.3 Drugs were separated from food	87.52	31.84	0.00	100.00
Drug packaging				
5.1 Drugs were stored in intact packaging	95.12	12.32	33.33	100.00
5.2 Drugs had sealed or zipped packaging	89.09	23.34	0.00	100.00
5.3 Drugs were stored with leaflets or instructions	80.89	26.94	0.00	100.00
5.4 Drugs were stored in primary packaging	85.08	25.16	0.00	100.00
Drug information				
6.1 Drug labels were present	86.79	23.82	0.00	100.00
6.2 Clear information was visible on drug labels, including drug name, dosage, frequency, expiry date and patient name	81.42	27.07	0.00	100.00
Expiration of drugs				
7.1 Presence of expiry date on drug packaging	92.13	16.96	0.00	100.00
7.2 Drugs had not expired	80.28	21.74	0.00	100.00
Subscale for drug-storage methods	*84.59*	*13.69*	*27.27*	*100.00*
Overall drug storage	*87.25*	*11.14*	*42.86*	*100.00*

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Overall mean in-home drug-storage compliance was 87.25%; mean compliance rates for individual dimensions were below 100%. The mean compliance rate for the drug-storage environment was clearly higher than that for drug-storage methods. For each dimension, the mean compliance rate varied among the participants: the mean compliance rate for keeping drugs at the recommended temperature was particularly variable, and the mean compliance rate for keeping drugs in safe locations was consistently low.

3.3 Correlations between Older Adults' Personal Characteristics and In-home Drug-storage Compliance

Table 3 shows the correlations between older adults' personal characteristics and their mean compliance rates with respect to drug-storage environment, drug-storage methods and overall drug storage. There were weak negative correlations between age and drug-storage environment (rs = -0.213, p = 0.021), drug-storage methods (rs = -0.187, p = 0.044) and overall drug storage (r = -0.190, p = 0.041). In addition, there were moderate positive correlations between educational level and drug-storage methods (rs = 0.306, p = 0.001) and overall drug storage (rs = 0.310, p = 0.001). No correlations were found between financial status and drug-storage compliance.

Table 4 shows the mean differences in drug-storage compliance rates between older adults grouped by personal characteristics. There was a statistically significant difference in compliance with drug-storage methods (p = 0.046) between participants of different genders. Male older adults showed higher compliance in drug-storage methods than female older adults. However, there was no significant difference in compliance with drug-storage environment and overall drug storage between participants of different genders. Furthermore, there was a statistically significant difference in compliance with drug-storage environment (p = 0.048) between older adults with different living statuses: older adults who lived with others showed better drug-storage environment compliance. However, there was no significant difference in compliance with drug-storage methods and overall drug storage between older adults with different living statuses. Moreover, there was no significant difference in drug-storage compliance between participants with different experiences of receiving community healthcare services and visiting community centers.

Table 3. Correlations between personal characteristics and compliance rates for drug-storage environment, drug-storage methods and overall drug storage (N = 117)

Personal characteristics		Compliance rate					
		Drug-storage environment		Drug-storage methods		Overall	
		rs	*p*	*rs*	*p*	*rs*	*p*
Age	65-74	-0.213	0.021*	-0.187	0.044*	-0.190	0.041*
	75-84						
	85+						
Educational level	Below primary	0.167	0.072	0.306	0.001*	0.310	0.001*
	Primary						
	Above primary						
Financial status	< $4,000	-0.014	0.881	0.093	0.317	0.061	0.514
	$4,000-$7,999						
	$8,000-$11,999						
	≥$12,000						

Note:
**p < 0.05*

Table 4. Mean differences between personal characteristics and compliance rates for drug- storage environment, drug-storage methods and overall drug storage (N = 117)

Personal characteristics		Compliance rate								
		Drug-storage environment			Drug-storage methods			Overall		
		Mean	*U*	*p*	Mean	*U*	*p*	Mean	*U*	*p*
Gender	Male	58.49	1716.5	0.821	66.00	1326.0	0.046*	65.84	1334.5	0.51
	Female	59.41			53.40			53.53		
Living status	Living alone	51.72	1411.5	0.048*	55.81	1301.0	0.577	54.69	1331.5	0.451
	Living with others	61.18			59.96			60.29		
Receiving community healthcare services	Yes	45.69	542.5	0.073	53.19	482.5	0.615	50.06	507.5	0.44
	No	59.98			59.43			59.66		
Visiting community centers	Yes	57.95	1068.0	0.803	57.86	1070.0	0.861	56.84	1092.5	0.74
	No	59.24			66.00			59.50		

Note:
**p < 0.05*

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To conclude, older adults' age, gender, educational level and living status were associated with their drug-storage compliance, whereas their financial status and experiences of receiving community healthcare services and visiting community centers were not.

4. Discussion

This study provided insights into the in-home drug-storage compliance of older adults. Its main finding was that older adults failed to comply with in-home drug-storage in terms of drug-storage environment and methods, especially those of advanced age, who had lower educational levels or who lived alone.

4.1 Compliance with Drug-storage Environment among Older Adults

Older adults in this study kept almost all drugs away from direct sunlight (99.48%) and in a dry environment (99.06%), but less frequently complied with keeping drugs at the recommended temperature (92.53%). They may have had a better understanding of appropriate conditions for drugs in terms of light and humidity than in terms of temperature, leading them to hide drugs from sunlight and store drugs in dry, well-ventilated places. Akin to Dutch older adults who failed to freeze more than half (53.2%) of drugs in accordance with instructions [34], Hong Kong older adults were also less compliant concerning storage temperature. Further, compliance rates with drug-storage temperature varied greatly; given that some of them exhibited extremely low compliance rates and should be targeted for education on correct drug-storage temperature procedures. Drug-storage location is an important criterion of proper drug storage, as locations such as kitchens and washrooms/bathrooms have unstable temperature and humidity [22,26]. This problem can be better addressed by future studies that record where older adults store drugs.

4.2 Compliance with Drug-storage Methods among Older Adults

Older adults' mean compliance rate for keeping drugs in locked cabinets and out of reach of children (58.14%) was the lowest among drug safety items, indicating that there was insufficient awareness of this issue. Although older adults stored most drugs with labels (86.79%), not all these labels had clear information on self-medication (81.42%), which poses a health risk. A study has found that 76% of adults used in-home stored drugs without medical consultation [23], which indicates that patients solely depended on the information on the label for self-administration. It is therefore essential to increase older adults' awareness of the necessity of keeping the original drug labels, which provide clear information on self-medication, to avoid incorrect drug intake.

Studies have found that the prevalence of keeping in-home drugs past their expiry date was 8% in Portugal [6], 18.5% in Turkey [1], and 27% in the United States [3], while among the older adults in this study, 19.72% had expired in-home drugs. Older adults in Hong Kong might be unaware of the dangers of keeping expired drugs, especially large quantities of drugs, at home. Expired drugs are dangerous, as they are associated with adverse drug reactions due to self-medication [2], but 23% of Irish respondents reported taking expired drugs [35]. Therefore, it is crucial to check drug expiry dates and discard expired drugs.

The older adults in this study mostly complied with storing drugs in intact packaging (95.12%); similarly, a Dutch study found that 95.3% of older adults stored drugs in intact packaging [34]. However, older adults in this study less frequently stored drugs in sealed or zipped packaging (89.09%) and might forget to seal it due to decreased memory capacity [27]. A study from the Netherlands has further found that older adults had difficulty sealing drug packaging completely, due to age-related physical limitations [24]. Thus, manufacturers or dispensers should use age-friendly drug packaging that does not require extensive fine motor skills to manipulate. Most importantly, older adults should double-check drug packaging is closed after sealing.

Older adults in this study also did not store all drugs in primary packaging (85.08%), which means that they might neglect primary packaging and re-organize drugs into secondary containers. This is dangerous, because essential drug information on primary packaging might be missed and lead to incorrect self-administration. In addition, chemical reactions may occur between the secondary container and drug [10,36]. It is therefore vital to increase older adults' awareness of the importance of primary packaging and instruct them to inform healthcare professionals about any broken primary packages.

Finally, older adults often failed to store drugs with accompanying leaflets or instructions (80.89%). Drug instructions are mainly printed in English in a very small font, and with terminology that might be unintelligible to older adults, and thus may be neglected. Studies have emphasized that drug information should be expressed in clear words, in a language appropriate to the target group [10,29]. Thus, for the older Hong Kong population, drug information should be written in Chinese, printed in a large font, and use simple language.

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4.3 Overall Drug-storage Compliance among Older Adults

This study showed that older adults did not comply with all of the drug-storage instructions, and the mean compliance rate for drug-storage methods was even lower (87.25%) than that for drug-storage environment (97.02%). As more than half of the participants engaged in self-medication without medical consultation, which could lead to dangerous medication use and undesired consequences [23,24], non-compliance with good in-home drug-storage practice should be addressed.

4.4 Association between Personal Characteristics and Drug-storage Compliance among Older Adults

4.4.1 Age

Drug-storage compliance was lower among adults of advanced age in this study. The prevalence of visual and cognitive impairment and difficulties with self-care increases with age [28,34], which might explain why older adults were unable to fully understand drug-storage instructions. We suggest that adults of advanced age, especially those with visual and cognitive impairments, should receive individual attention, continuous education and monitoring to ensure that they have correct drug-storage practice [27]. In addition, important instructions should be made visible and highlighted with contrasting colors on drug labels, to assist drug-storage compliance and ensure patient safety [9]. Usage instructions should be comprehensible to older adults, printed in a large font size, with key points in summarized and given in boldface rather than being embedded within long sentences. Simple, clear wording should be used, with a visual emphasis on important information, such as the expiry date.

4.4.2 Educational Level

Our findings showed that older adults' educational level positively influenced their compliance with drug-storage methods. Similarly, previous findings have indicated that participants who had a higher educational level showed higher drug-storage compliance [5,17]. More than half of the older adults in this study had a primary educational level at most; thus, they might be barely literate and might misunderstand usage instructions. Literacy would facilitate individuals' comprehension of drug labels [5], and education would improve awareness and understanding of drug-storage instructions [12]. In addition to easy-to-read drug instructions, illustrations and audio-visual demonstrations may help older adults, especially those who are illiterate [27].

4.4.3 Living Status

This study showed that older adults who lived alone were less compliant with drug-storage instructions than those who lived with family members. This result agrees with a local study that showed that older adults who lived alone lacked social support, and thus were unable to obtain resources and support when they encountered difficulties in drug management [20]. However, family members at home could help explain drug instructions to elders and increase their safety awareness. Further, when living with others in a shared living environment, the temperature, humidity and lighting will also be adjusted by other family members. In mainland China, the number of family members was found to be associated with in-home drug-storage temperature compliance [12]. For those living with others, it is strongly suggested that family members be involved in drug-storage compliance.

To conclude, proper in-home drug storage is crucial for avoiding incorrect self-medication. The main finding of this study is that older adults often fail to comply with in-home drug-storage standards regarding drug-storage environment and drug-storage methods, and that those who are advanced in age, have lower educational levels or live alone are less compliant. Therefore, strategies are needed to promote older adults' in-home drug-storage compliance. One study has shown that 95% of participants encountered practical problems reading drug labels, understanding instructions for use and handling the packaging, and yet patients rarely raised concerns about drug management [24]. A lack of effective communication between patients and healthcare professionals can lead to misunderstandings during treatment [29], and misconceptions about drug storage also hinder older adults' compliance [19,24]. Hence, we recommend that healthcare professionals proactively and regularly assess older adults' drug-storage compliance.

5. Limitations

Our use of a convenience sampling method limits this study's generalizability and may affect its internal validity. The participants' awareness of the study's purpose might have led to overestimates of their compliance rates, because that they might have changed their drug-storage environment and drug-storage methods prior to the home visit. However, due to ethical considerations, the participants were informed of the study purpose.

6. Future Research

Future studies should use a larger sample size and adopt

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probability sampling to increase the generalizability of the findings. To implement drug-storage enhancement programs among older adults, further research should examine the effectiveness of drug-education program elements and home support and investigate how elder-friendly drug-package design could facilitate correct in-home drug storage by older adults.

7. Recommendations

Healthcare professionals should proactively use our in-home drug-storage checklist to identify high-risk individuals, develop educational programs, and provide home support. Special attention should be given to those who are advanced in age, less educated or living alone. In addition, existing health-education strategies should be revised to emphasize the importance of correct drug-storage environments and drug-storage methods. Specific areas to emphasize include maintaining appropriate drug-storage temperature, maintaining drug safety, keeping original drug labels intact with clear drug usage information, checking drug expiry dates and discarding expired drugs, double-checking after sealing drug packaging and using primary packaging. Improved drug-package design could also increase in-home drug-storage compliance, and such improvements should include easy-to-seal packaging and easy-to-read instructions. The use of supplementary pictorial illustrations and audio-visual aids can help older adults understand drug-storage instructions. Family members should be encouraged to support older adults' in-home drug-storage compliance.

8. Conclusion

This study found that older adults often failed to comply with in-home drug-storage instructions, in terms of drug-storage environments and drug-storage methods. Older adults who were advanced in age, were less educated, or lived alone exhibited lower in-home drug-storage compliance. Healthcare professionals should take a proactive role in assessing older adults' in-home drug-storage compliance, delivering drug-storage support and revising health education strategies. Elder-friendly drug-package design and supplementary pictorial illustrations and audio-visual aids can help older adults understand drug-storage instructions. Family members should also be involved in increasing in-home drug-storage compliance among older adults.

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- Program: Microsoft Word (preferred)
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- Paragraph: Justified
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All articles should include a cover letter as a separate document.

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- A brief description of the novelty and importance of the findings detailed in the paper

Declaration

v Conflict of Interest

Examples of conflicts of interest include (but are not limited to):

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This section confirms that written consent was obtained from all participants prior to the study.

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Authors should also include 5-8 keywords after the abstract, separated by a semi-colon, avoiding the words already used in the title of the article.

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Titles should be reflected as font size 26, and in bold type.

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Section headings, sub-headings, and sub-subheadings should be differentiated by font size.

Section Headings: Font size 22, bold type

Sub-Headings: Font size 16, bold type

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Main Manuscript Outline

Ⅴ. Introduction

The introduction should highlight the significance of the research conducted, in particular, in relation to current state of research in the field. A clear research objective should be conveyed within a single sentence.

Ⅵ. Methodology/Methods

In this section, the methods used to obtain the results in the paper should be clearly elucidated. This allows readers to be able to replicate the study in the future. Authors should ensure that any references made to other research or experiments should be clearly cited.

Ⅶ. Results

In this section, the results of experiments conducted should be detailed. The results should not be discussed at length in

this section. Alternatively, Results and Discussion can also be combined to a single section.

Ⅷ. Discussion

In this section, the results of the experiments conducted can be discussed in detail. Authors should discuss the direct and indirect implications of their findings, and also discuss if the results obtain reflect the current state of research in the field. Applications for the research should be discussed in this section. Suggestions for future research can also be discussed in this section.

Ⅸ. Conclusion

This section offers closure for the paper. An effective conclusion will need to sum up the principal findings of the papers, and its implications for further research.

Ⅹ. References

References should be included as a separate page from the main manuscript. For parts of the manuscript that have referenced a particular source, a superscript (ie. [x]) should be included next to the referenced text.

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Ⅺ. Glossary of Publication Type

J = Journal/Magazine

M = Monograph/Book

C = (Article) Collection

D = Dissertation/Thesis

P = Patent

S = Standards

N = Newspapers

R = Reports

Kindly note that the order of appearance of the referenced source should follow its order of appearance in the main manuscript.

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Graphs, figures and tables should be labelled closely below it and aligned to the center. Each data presentation type should be labelled as Graph, Figure, or Table, and its sequence should be in running order, separate from each other.

Equations should be aligned to the left, and numbered with in running order with its number in parenthesis (aligned right).

Ⅻ. Others

Conflicts of interest, acknowledgements, and publication ethics should also be declared in the final version of the manuscript. Instructions have been provided as its counterpart under Cover Letter.

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Journal of Geriatric Medicine is an international peer-reviewed journal specializing in gerontology research. Gerontology research is focused on the study of the ageing process, as well as the problems faced by the elderly. As a result of the prevalence of the ageing population issue faced by many nations worldwide, gerontology research has gained increased emphasis.

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