UNIVERSITI PUTRA MALAYSIA

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BY

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LIST OF ABBREVIATION

ADL	Activities of Daily Living Scale
BIA	Bioelectrical impedance analysis
BMI	Body Mass Index
DRIE	Dehydration Recognition In our Elders
DST	Dehydration Screening Tool
EPESE	Established Populations for Epidemiologic Studies of the Elderly
GARU	Geriatric and Rehabilitation Unit
GDP	Gross Domestic Product
JKEUPM	Ethics Committee for Research Involving Human Subjects, University Putra Malaysia
NHANES	National Health and Nutrition Examination Survey
NU-AGE	New dietary strategies addressing the specific needs of elderly population for a healthy ageing in Europe
MMSE	Mini Mental State Examination
SENECA	Survey in Europe on Nutrition and the Elderly a Concerted Action
UK	United Kingdom
US	United States of America
WHO	World Health Organization

ABSTRACT

PREVALENCE AND FACTORS ASSOCIATED WITH DEHYDRATION AMONG ELDERLY AT SELECTED PRIVATE CARE HOMES IN SELANGOR

Nabil Bin Mazri

The cross sectional study aimed to determine the prevalence of dehydration and associated factors among elderly at selected private care homes in Selangor. A total of 114 subjects age 60 and above were participated in this study. The interview face-to-face was conducted to acquire a necessary information from the subjects. The instruments used were a self-administered questionnaire and it consisted of seven parts which are socio-demographic characteristics, anthropometric measurement, Mini Mental State Examination (MMSE), Activities of Daily Living Scale (ADL) and Dehydration Screening Tool (DST). Majority of the subjects were male (64.0 %) and Malay (58.8 %) with mean age 70 ± 7. The result shows the prevalence of dehydration among elderly in selected private care homes was 67.5 %. Only two variables were found to be significantly associated with dehydration which are previous occupation (x^2=0.002,p<0.001) and total glasses intake per day (r=-0.247,p<0.008). No significant association in socio-demographic characteristics (age, period admission, ethnicity, marital status, educational level, monthly expenses), body weight status, cognitive status and functional status with dehydration. This finding in this present study mostly contradicts with findings of the previous study especially about the factors associated with dehydration. In conclusion, the prevalence of dehydration was higher as compared in worldwide. Future study needs to be done to investigate more details about the factors and the prevention of dehydration problem among elderly.

ABSTRAK

PREVALEN AND FAKTOR YANG BERKAITAN DENGAN DEHIDRASI DALAM KALANGAN ORANG TUA DI RUMAH PENJAGAAN SWASTA DI SELANGOR.

Nabil Bin Mazri

Kajian keratan rentas bertujuan untuk menentukan kelaziman dehidrasi dan faktor-faktor yang berkaitan dengan warga tua di rumah penjagaan swasta terpilih di Selangor. Sejumlah 114 subjek yang berumur 60 tahun keatas telah terlibat dalam kajian ini. Instrumen yang digunakan adalah soal selidik sendiri dan terdiri daripada tujuh bahagian yang mempunyai ciri-ciri sosio-demografi, pengukuran antropometri, Mini Mental State Examination (MMSE), Aktiviti Skala Hidup Harian (ADL) dan Alat Pemeriksaan Dehidrasi (DST). Majoriti subjek adalah lelaki (64.0%) dan Melayu (58.8%) dengan usia kebanyakannya70 ± 7. Hasilnya menunjukkan prevalen dehidrasi di kalangan warga tua di rumah jagaan swasta terpilih adalah 67.5%. Hanya dua pembolehubah yang didapati mempunyai kaitan dengan dehidrasi iaitu pekerjaaan yang terdahulu (x^2=0.002,p<0.001) dan jumlah pengambilan gelas air per hari (r=-0.247,p<0.008).Tiada perkaitan yang signifikan dalam ciri-ciri sosio-demografi (umur, kemasukan waktu, etnik, status perkahwinan, tahap pendidikan, perbelanjaan bulanan), status berat badan, status kognitif dan status fungsi badan dengan dehidrasi. Penemuan dalam kajian ini kebanyakannya bercanggah dengan penemuan kajian terdahulu terutama mengenai faktor-faktor yang berkaitan dengan dehidrasi. Kesimpulanya, prevalen dehidrasi adalah tinggi. Kajian masa depan perlu dilakukan untuk mengkaji lebih banyak maklumat mengenai faktor-faktor dan pencegahan masalah dehidrasi di kalangan warga tua.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

According to World Health Organization (2018), elderly is population which is 60 years old and above. Global population reached 7 billion in 2012, 562 million which is 8 % from total population were aged 65 and over. 3 years later 2015, the older population rose by 55 million and the proportion of the older population reached 8.5 % of the total population (Bureau, 2016). Malaysia's population 2018 is estimated at 32.4 million with the annual population growth rate of 1.1% (Department of Statistics Malaysia, 2018). Thus, elderly population was estimated 2.1 million which is 65% of the total population (Assist, 2018).

National Centre for Health Statistics (2014) state that there were 15,600 long term care (LTC) homes in the United States place around 1.4 million older people. Also in 2013 there were an amount of 5,153 nursing homes and 12,525 residential care homes in the United Kingdom which the resident whom 65 years of age or older were over 90% of residents (Namasivayam-MacDonald et al., 2018). As of 2015 in Japan, approximately 1.69 million people lived in LTC homes, which was a 40% increase from 2012 (Namasivayam-MacDonald et al., 2018). Increasing number of elderly should be taken seriously because they also demand for on social and health services.

Dehydration is one of the risks that they may face through their old life. Dehydration is defined as the condition that results from excessive loss of body water and also due to insufficient fluid intake (Hooper et al., 2015). It also can be defined as depletion in total

body water content due to diminished fluid intake, pathologic fluid losses or a combination of both. The change of body weight was measured from the change of body water (Adan & Adan, 2012). There are particularly acute dangers for the institutionalized elderly (Nessa & Johnson, 2010). Dehydration was associated with hospital mortality rates ranging from 42% to 60% (Stelfox et al., 2008). In 2015, Hooper stated that 20% of older people living in United Kingdom (UK) residential care are dehydrated, 40% dehydrated on UK hospital admission and less than 20% of free-living United State older people are dehydrated.

Some elderly intentionally restrict their water intake because their ability to go to the toilet is difficult, so they decide to take the decision to retain thirsty and may risk to dehydration (Wolff, Stuckler, & Mckee, 2015). As they become older it affects functional and cognitive abilities in the elderly. Elderly undergoes so many changes that affect dehydration because of the urinary system function and the internal organs function of the system as a whole coupled with morbidity and medication (Musaa, 2013).

Dehydration is one of health problem that happen among elderly. Thus, this research is to determine the prevalence and factors associated with dehydration among elderly at selected private care homes in, Selangor.

1.2 PROBLEM STATEMENT

Dehydration is prevalence among elderly. In 2005, Stookey states that 21% of the 70 year olds and above in the Duke component of the Established Populations for Epidemiologic Studies of the Elderly (EPESE) cohort and 28% of the 70–90 years olds in the US National Health and Nutrition Examination Survey (NHANES) III cohort found to have dehydration. Cross-sectional studies from Hooper et al. (2014) suggest a water loss dehydration prevalence of 20–30% in this elderly population. EPESE cohort also state that, 23% of people with raised tonicity also had raised serum glucose lead to dehydration due to insufficient fluid intake was present in 16% of these older adults (Stookey et al., 2005).

In the US, institutionalised elderly people were reported to have lower mean daily fluid intake of 1.51 L/day compared with 2.12 L/day in their non-institutionalised counterparts (Adams, 1988). Whereas in the UK free-living people aged 65 and over drank 1.30 L/day compared to 1.16 L/day in those living in institutions (Finch et al., 1998). Measuring fluid intake is a challenge, especially in older people, and the use of different methods and different standards makes the comparison of results from different studies difficult (Hooper, Bunn, Jimoh, & Fairweather-Tait, 2014). NU-AGE also did the same research to study the relationship between fluid intake and hydration status in a community-based older population. Thus, this study the association of fluid intake with dehydration among institutionalized elderly people.

Many elderly people such as those cognitively impaired have difficulties to communicate their needs efficiently. They also not be able to express the needs for drinking despite the strong thirst sensation (Bak et al, 2017, Wilson, 2014, Bunn, Jimoh, & Howard, 2015. Research has shown that cognitive and physical issues start to rise with a loss of water

in the body as little as 1% (Mentes et al., 2006). This finding is different to Hall (2005) that states no significant relationships between any of the cognitive variables and hydration variables. Thus this study was conducted to compare the association between cognitive status and dehydration between the previous research.

Functional status contribute with ability and mobility of the elderly. How they get access to water, toilet and do physical activity. Numerous studies have demonstrated a close association between functional impairment and urinary incontinence in the frail elderly population. The current study found that the relationship between dehydration and salivary output was age-independent, which is consistent with the presence of a salivary secretory reserve (Ship & Fischer, 1997). Functional status also effect by low fluid intake in community-dwelling older adults (Hooper et al., 2018). Thus, this study was done to strengthen the result from other research about associaton of functional status and dehydration.

1.3 RESEARCH QUESTIONS

1. What is the prevalence of dehydration among elderly in selected private care homes in Selangor?
2. What are the associations between socio-demographic characteristics, body weight status, fluid intake, cognitive status and functional status among elderly in selected private care homes in Selangor?

1.4 SIGNIFICANCE OF THE STUDY

Dehydration was one of the serious health issue but not well aware by public. It was because there are lacks of study reporting the prevalence of dehydration among elderly previously in Malaysia. This study was significant because it provided more information about dehydration among elderly. Therefore, this study was important to determine the prevalence of dehydration among elderly in selected private care homes in Selangor and also to determine the association between socio-demographic, body weight status, fluid intake, cognitive status and functional status with dehydration.

Apart from that, this study had generated new information and knowledge to the care home institution to help the elderly to be healthy. Besides, this study also can be served as the baseline for the future research who is interested in this field of study. Other than that, this study may provide beneficial information for policy makers to develop new policy, thus implement affective intervention program to the elderly population in our country.

1.5 OBJECTIVES

1.5.1 General Objectives

The general objective of this study is to determine prevalence and factors of socio-demographics, body weight status, fluid intake, cognitive status and functional status that associated with dehydration among elderly at selected private care homes in Selangor.

1.5.2 Specific Objectives

1. To determine the socio-demographics, body weight status, fluid intake, cognitive status and functional status among elderly at selected private care homes in Selangor.

2. To determine the prevalence of dehydration among elderly at selected private care homes in Selangor.

3. To determine the associations factors between socio-demographics, body weight status, fluid intake, cognitive status and functional status with dehydration among elderly at selected private care homes in Selangor.

1.6 NULL HYPOTHESIS

There are no associations between socio-demographics, body weight status, fluid intake, cognitive status and functional status with dehydration among elderly at selected private care homes in Selangor.

1.7 CONCEPTUAL FRAMEWORK

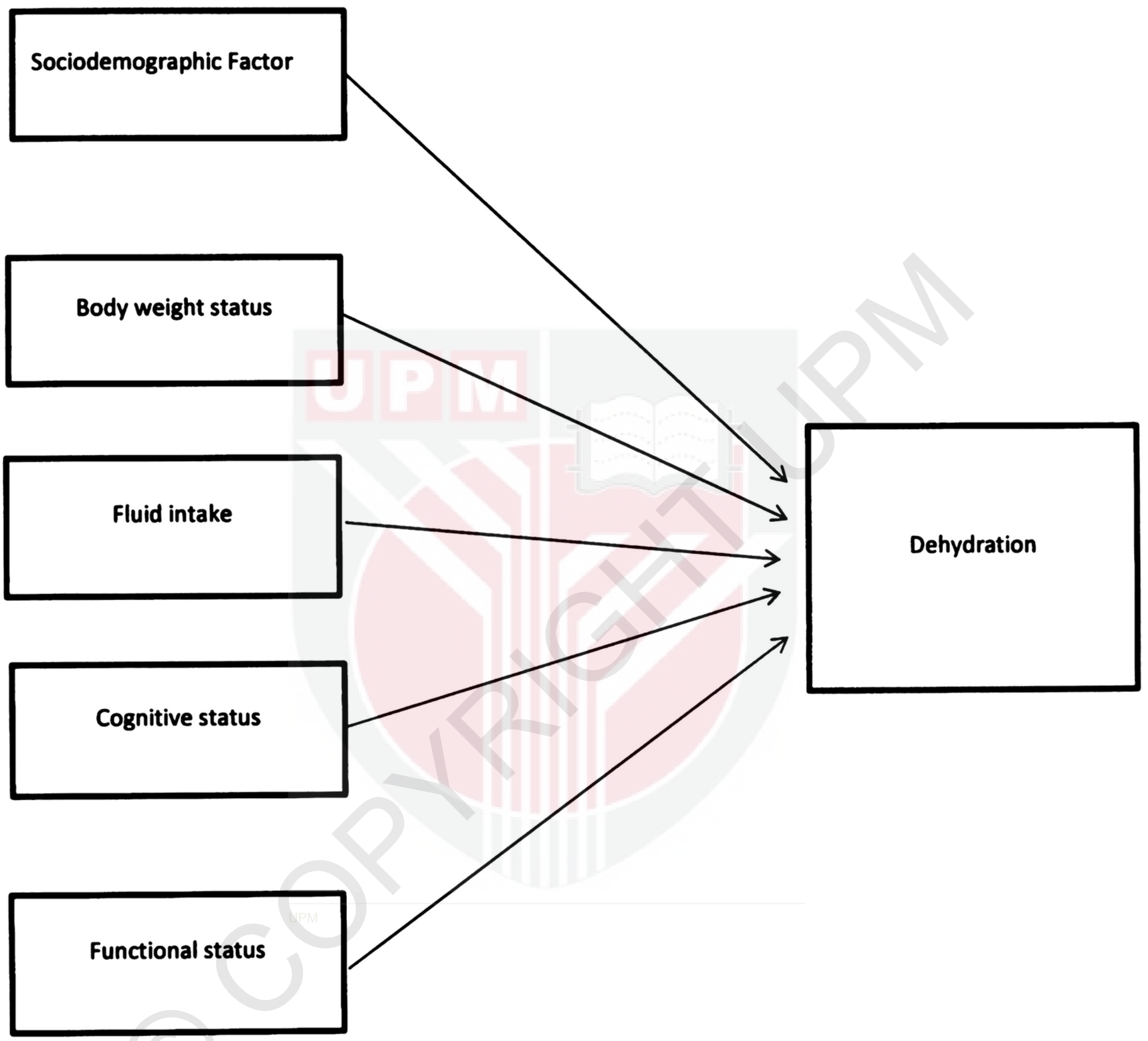

Figure 1.1 : Conceptual Framework

In this study, the dependent variable (DV) was dehydration whereas the independent variables (IV) were socio-demographic factors, body weight status, fluid intake, cognitive status and functional status. This study aimed to determine the prevalence of dehydration and its associated factors such as demographic factors, body weight status, fluid intake, cognitive status and functional status among elderly at selected private care homes in Selangor.

The association of socio-demographic factors with dehydration was supported by Bouchet et al. (2000); Bunn, Jimoh, & Howard (2015); El-Sharkawy et al., (2015); Jette et al. (1986); Lancaster et al. (2003); Parkerson et al. (1990); Rodrigues, Severo, & Lopes (2015);. The association between body weight status with dehydration was supported by study Bak, Tsiami, & Greene (2017); Murphy (1998); Ship & Fischer, (1997); Weinberg and Minaker (1995). The association between fluid intakes with dehydration was supported by Gasper (1999); Hooper et al. (2014); Hooper (2015). The association cognitive status with dehydration was supported by Hall (2005); Namasivayam-MacDonald et al. (2018). The association between functional status with dehydration was supported by Angela (2007); Steward et al. (2009).

This conceptual framework was developed based on the previous study to determine the prevalence of dehydration and its associated factors among elderly at the selected private care homes in Selangor. The previous studies were important as it will give the evidence based to the present study.

CHAPTER 2

2 LITERATURE REVIEW

2.1 Background

2.1.1 Definition

Dehydration comes from the Greek words hydro which means water and de which means removal, deprivation or separation; depletion in total body water content due to pathologic fluid losses, diminished fluid intake, or a combination of both (Musaa, 2013). Dehydration can be defined as the loss of water or body fluids from an individual (WHO, 2002). Begum and Johnson state that dehydration depletion in total body water content due to fluid losses, diminished fluid intake, or a combination of both. Also define as 'a complex condition resulting in a reduction in total body water (Thomas et al., 2008). Some research state that dehydration as same as hypernatremia which is body with high concentration in sodium ions, by mean lack of water.

2.1.2 Population at risk

The Statistics Department's latest data in 2017 sets Malaysia's population to 32 million people, involving 28.7 Malaysians and the rest non-citizens. O'Connor et al. found hypernatremia in 2.1% of 336 elderly patients (mean age 81.4 years) in a cross-sectional study. Elderly people has increased the demand on general practitioners with high morbidity and disability (Black D. and Bowman C. , 1997). Fahey, Montgomery, Barnes, & Protheroe (2003) state results of their study that elderly people in one UK city are receiving inadequate care. Elderly are the population that do not being help in use of beneficial drugs; poor

monitoring of chronic disease; and overuse of inappropriate or unnecessary drugs. No study has examined the overall quality of care given to elderly patients in UK.

In the US, institutionalised elderly people were reported to have lower mean daily fluid intake (food and drink) of 1.51 L/day compared with 2.12 L/day in their non-institutionalised counterparts (Adams, 1988). Elderly people living in long-term care tend to drink less and have less variety of drinks than their community-dwelling counterparts (Adams, 1988; Mentes, 2006; Iowa-Veterans Affairs Research, 2000). Hooper et al. (2014) come out a conclusion that elderly adults in residential care have been considered to be a population at high risk of dehydration. Hypernatremia appears more frequently in individuals with an altered status, unconscious patients, infants, and elderly patient's age 65 years and above.

2.1.3 Sign and symptoms

Dehydration can be recognising by observing the signs and symptoms. Bak, Tsiami, & Green (2017) and Bataille et al. (2014) recognise the sign by dryness of the mouth; poor skin turgor, dry oral mucosa, elasticity, hypotonic ocular globes and increased thirst for instance. Other studies state that the sign are capillary refill time, general appearance, absent tears, abnormal breathing, sunken eyes, abnormal radial pulse, tachycardia or decreased urine output and abnormal respiratory pattern were the most useful signs in predicting dehydration which is loss of 5% of body weight (Hooper et al., 2014, Gorelick et al.,1997)

Non-specific neurologic symptoms also will effect like light-headedness, nausea, headache, fatigue, lethargy, dizziness, confusion, seizures, and even coma (Mortalität, Siemers, & Mailänder, 2010) and (Arieff, 1984). As age increase, functional body also decrease in action. The age related changes, sun-damaged skin or breathing through the

mouth can produce similar, poor sensitivity and specificity (Practice & Dehydration, n.d.) and (Bak et al., 2017).

Some of the sign stated was happen in children. We cannot use these signs of dehydration in children directly in older people before checking that they are truly diagnostic, for a variety of reasons.

2.2 Prevalence of dehydration

Study from Hooper et al., (2013) stated that cross-sectional studies that they study suggested a water-loss dehydration prevalence of 20–30% in elderly at Notfolk, United Kingdom. The statement supported by result state that salt-loss dehydration is present in 0.5–2% of free-living population samples of people aged at least 70 years (Stookey, 2005; Stookey et al., 2005).

In the NHANES III cohort data were compared for different age bands, suggesting that the proportion of adults with water-loss dehydration increases with age, from around 16% of 20–29 year olds, to 26% of 50–69 year olds and 28% of 70–90 year old. Dehydration was more common in men of all ages, 23% than women of the same age range, 16% (Stookey, 2005) Chumlea and colleagues (2002) using NHANES also state that based on bioelectrical impedance measures of total body water in a large sample suggest that many people may be under hydrated.

Dehydration Recognition In our Elders (DRIE) (2015) stated that the subjects included 188 residents (mean age 86 years, 66% women) of whom 20% were dehydrated. The study design was cohort study done by Hooper et al in 2018. The result also supported by Gasper (1999) which found that 8% of 36 long-term care residents had chance to get

dehydration and also state by Stotts which found that 19% of 48 nursing home residents at risk for pressure ulcers had current dehydration and a further 44% had impending dehydration.

Geriatric and Rehabilitation Unit (GARU) (2008) found that the dehydration prevalence of subject on admission was 16.3%, higher than the annual ICD-coded dehydration figures for GARU 5.3%. All the subjects were deemed to be mild. This was research that been done by Vivanti. et al in 2008 at Australia. Observational longitudinal cohort study design was used to do the research for 43 subjects.

Table 2.1: Prevalence of dehydration among elderly

Author (s), year	Setting	Tools	Prevalence
Stookey, 2005	United States	Cross sectional studies	21 %
Stookey, 2005	United States	NHANES III	28 %
Hooper et al, 2013	United Kingdom	DRIE	20 – 30 %
V. Angela, 2007	Brisbon, Australia	GARU	16.3 %

2.3 Determination of hydration status

2.3.1 Serum osmolality

Serum osmolality was one of method that researcher use to screen dehydration. Many study prove that the method used was proved and validated. US Panel on Dietary Reference Intakes for Electrolytes and Water stated ''the primary indicator of hydration status is plasma or serum osmolality'' (Institute of Medicine, 2004). Also prove by one study that state serum osmolality (the concentration of solutes in the blood) is arguably the most valuable hematologic parameter to assess hydration status and is considered by some a gold standard technique to detect dehydration in the clinical setting. Serum osmolality has been

adopted most often as the reference standard for dehydration in older adults (Cheuvront et al., 2013; Thomaset al., 2008)

Serum osmolality appears useful as a marker of water loss dehydration when tested on a single occasion in young adults. Plasma osmolality is known as key regulator of fluid balance and higher osmolality indicating poorer hydration. (Shirreffs, 2000; Kovacs, Senden, & Brouns, 1999).

Although this method come out as a gold standard to screen dehydration, but they are involving urine and blood samples and are consequently more expensive and intrusive than diaries and surveys or other methods. The blood tests are not feasible or practical in the community or residential care settings (Leibovitz et al., 2007).

2.3.2 Bioelectrical impedance analysis

Bioelectrical impedance may be useful in calculating total body water or total body resistance but does not appear to be sufficiently accurate under conditions of change in hydration status compare to serum osmolality. (Kafri et al., 2013; Kyle et al., 2004; Olde Rikkert et al., 1997; Hall,2005; Bunn et al.,2015). BIA was used as a primary measure of hydration status in the present study, while urine colour and a diet diary were used as secondary measures of hydration status. BIA has been shown to be a reliable and valid measure of body water composition (Smye, Sutcliffe, & Pitt 1993). BIA also was easy and quick method, but it is affected by numerous conditions (Shirreffs, 2003).

The technique has been widely used in the nutrition field to estimate body composition. It utilizes a mild electrical current that travels between electrodes placed on hands and feet while the resistance of its flow is measured. The higher resistance is expected

in the less conductive tissues such as fat. The obtained resistance is used to calculate the water volume (Bak et al., 2017).

We need around 20 minute with 15 minutes rest and 5 minutes data collection whenever wants to use this method. It will identify resistance and reactance value that reflect an individual's level of hydration. There is no consumption of food or liquid for the past two hours before conducting the BIA. Ideally use the BIA in the morning after long period of sleep and hours of fasting (Roubenoff et al., 1997).

Bioelectrical impedance analysis appears be cost-effective, while maximizing accuracy and minimizing invasiveness (Hall, 2005). There is a minimal risk of injuring skin when removing the bioelectrical impedance electrodes if a participant's skin is particularly dry or thin due to aging (Foley, 2013).

2.3.3 Dehydration Screening Tool

Dehydration screening tool (DST) is one of many tools that can be used to access hydration status in elderly people. DST was developed based on the Vivanti et al. (2010). DST build based on 11 items, four physical signs of dehydration and seven questions about thirst sensation, pain and mobility, with added four extra questions about drinking habits. Two factors emerged from factor analysis, which were named Hydration Score and Pain Score. Hydration Score consisting of five questions about thirst sensation and preferences related to fluid consumption, while Pain Score, consisting of five items about mobility and pain (Rodrigues, Severo, & Lopes, 2015).

2.4 Factors associated with dehydration

2.4.1 Socio-demographic

Socio-demographic was used to differentiate between different sub-groups when the sample is large enough. Next it also can leghten our survey significant. As many researcher state that the dropout rate of a survey correlates positively with the length of the survey. Element that include in socio-demographic questions are age, sex, ethnicity, marital status, past occupation, educational level.

Based on Rodrigues et al. (2015) studies, it was stated that women were in higher proportion both in institutionalized (55.2%) and community-dwelling elderly subjects (62.2%). The SENECA study also prove that women were higher in getting dehydration which assessed total water intake in several European countries and found that 13–42% of men and 21–65% of women aged 75–86 in Europe had a total water intake of less than 1.7 kg/d. But there are difference in other studies that stated that dehydration was more common in men of all ages (23% in men aged 20–90) than women of the same age range (16%) (Stookey, 2005). The result also supported by Kenkmann et al., (2010) which men to have current water-loss dehydration (25%) than women (17%). Thus this study will supported it is sex was associated with dehydration among elderly.

Some studies have reported greater memory complaints in women compared to men for cognitive status (Gino et al., 2010). And for educational level, Rodrigues et al. (2015) stated that community-dwelling participants reported a higher education attainment, being 41.9% classified with middle school or higher level, compared to 30.0% in the institutionalized group.

2.4.2 Body Weight Status

The severity of dehydration can be defined by the percentage of body weight loss (Phillips et al. 1984). Loss of body weight also compromise physiologic function and influence performance negatively (Casa et al. 2000). Each dehydrate subjects were assessed by determining the body weight status (Casa et al. 2000). Basically loss of weight is caused by loss of fluid volume. Measuring body weight status was accepted process for the confirmation of dehydration (Weinberg and Minaker, 1995; Murphy, 1998).

Based on Khan et al. (2015) studies, it was stated that the majority (59%) of participants had normal BMI-for-age low than 85th percentile; approximately 70% of the participants were lower-fit. Low body mass index (BMI less than 20) and presence of a dry tongue were included for assessment as potential dehydration screening methods (Vivanti, Harvey, & Ash, 2010). But there is difference in result of one study that state the association between dehydration and total body water was confounded by BMI (Angela, 2007).

Body weight status can be measured by using anthropometric data. The anthropometric measurement that needs to be assessed includes the height, weight, body mass index (BMI). All the data for this part was filled up by the interviewer. Height and weight of the subjects need to be measured to calculate the BMI of the subject. Assessing an individual's height with accuracy plays a crucial role in determining the nutritional status of patients (Hwang, Kim, Kang, & Kang, 2009).

2.4.3 Fluid Intake

We should also remember that most foods, especially fruits and vegetables, milk and milk products, contain water. Two points related from this. First, we need to take account of

what they are eating and drinking in assessing whether the elderly are getting enough fluids. Second, one effective way to improve elders' fluid intake is to get them to eat food with high fluid content, such as fresh vegetables, fruit, fresh cheese, and yogurt (Nessa & Johnson, 2010).

Water loss or dehydration is due to insufficient fluid intake (Hooper et al., 2014). Early analyses suggest that clinical and physical signs include low fluid intake, but the signs not appear diagnostically accurate to be used as single markers of dehydration in older people (Hooper et al., 2014). Stookey et al. (2005) suggested that dehydration is due to insufficient fluid intake was present in 16% of these older adults. But there is different in studies from Lindeman et al which they found that there is no evidence that fluid intake of less than six glasses per day was associated with hypernatremia dehydration.

Based on their age period, it is suggests a greater risk of reduced fluid intake occurs (Gasper 1999). As the fluid intake is based on thirst sensation, elderly may reduce the thirst sensation as the functional status was declined. Some examples include decreased thirst perception in those suffering from Alzheimer's and cerebrovascular disease, decreased fluid intake due to dysphagia (Kayser Jones and Pengilly 1999; Palmer et al., 2000).

A recommendation of six to eight glasses of water a day was important because of higher risk of dehydration among older adults (Russel, 1999). This is in agreement with fluid recommendations in Malaysian Dietary Guidelines (MDG, 1999). According to recommendations by the Institute of Medicine (2005), older individuals may not be consuming adequate amounts of fluid; recommendations are 3700 mL and 2700 mL in men and women, respectively.

No evidence exists of an increased risk of dehydration with the habitual consumption of caffeinated beverages and that restriction may even be deleterious amongst those with limited water intake (Maughan and Griffin 2003). Adequate fluid intake is critical for the safe elimination of toxins and waste products (Namasivayam-MacDonald et al., 2018). 81% of total water intake should come from beverages, including drinking water, and only 19% of fluids should come from foods. Providing a variety of drinks, promotes fluid intake by contributing to the overall pleasure of drinking (Godfrey et al., 2012; Robinson and Rosher, 2002). Thus, promoting the social aspect of drinking amongst care home residents may improve fluid intake and prevent dehydration (Gleibs et al., 2011).

2.4.4 Cognitive Status

Many elderly people such as those cognitively impaired have difficulties to communicate their needs efficiently also not be able to express the needs for drinking despite the strong thirst sensation, (Bak et al., 2017; Wilson, 2014; Bunn et al. 2015). Some elderly also do not have the ability to get water or simply do not remember to drink. They get help from the caregivers without which they can become dehydrated it they are in institutionalized settings.

Some active residents may get dehydrated if they are ignored and not followed. Their over activity can also cause them to be dehydrated if they do not consume sufficient fluids to regulate the body fluid (Musaa, 2013). Cognitive indicates that complete dryness is unlikely for certain frail patients (Fonda, 1990) . Of the few well controlled experimental studies conducted with younger adults that specifically measure cognitive performance across different levels of hydration, all address moderate or severe hypo hydration on an acute level (Hall, 2005).

It has been hypothesized that the effects of dehydration are the cause of the cognitive impairments accompanying rapid weight loss in young adults (Armstrong & Epstein, 1999; Maughan & Shirreffs, 1997). UK population based study of 15,000 home dwelling people aged over 75 identified that 18.3% had cognitive impairment (Rait G. et al. 2005). Research has shown that cognitive and physical issues start to rise with a loss of water in the body as little as 1% (Mentes et al, 2006). Another research state the cognitive decline resulting from dementia frequently is associated with dysphagia, and dysphagia is a known factor that adversely affects hydration levels (Easterling & Robbins, 2008)

Studies by Cian et al., (2000), Sharma et al., (1986) and Gopinathan et al., (1988) provide the most convincing evidence that dehydration negatively impacts cognitive performance in the areas of attention, speeded processing, and short-term memory and recognition. The result also supported by Hall (2005) that state no significant relationships between any of the cognitive variables and hydration variables except that higher TBW/WT was correlated with better attention (Hall, 2005). In general, data indicate that dehydration negatively impacts mental functioning of older adults and that once patients are rehydrated, functioning returns to normal (Hall, 2005).

2.4.5 Functional Status

Functional factors which put the elderly at risk of dehydration include mobility disorders and infrequent urination (Begum & Johnson 2010); refusal of fluids at meal or snack times, need of assistance when eating and drinking and difficulties to communicate fluid needs (Fraser 2009). Stewart et al. (2009) stated that incontinence leading to deliberate poor intake of fluids. This make the elderly keep themselves thirsty to avoid the

incontinence. Some study also stated that the elderly were lack of attention from caregivers that causes the elderly do not have enough fluid intakes (Ferry 2005).

Next, Musaa (2013) state that elderly were in poor thirst sensation and low functional ability to go to the toilet independently (Musaa, 2013). Amongst residents receiving terminal care dehydration is a common problem hence caregivers should pay special attention to it in care plan. Functional limitation and overweight status affected over half of the sample. Chronic disease comorbidity was reported by 42% of subjects (Stookey, Pieper, & Cohen, 2005).

CHAPTER 3

3 METHODOLOGY

3.1 STUDY DESIGN

A cross sectional study was conducted to determine the association between socio-demographic, body weight status, fluid intake, cognitive status and functional status with dehydration among elderly at selected private care homes in Selangor.

3.2 STUDY LOCATION

This study was conducted in Selangor. The state of Selangor has the largest economy in Malaysia in terms of gross domestic product (GDP). It is the most developed state in Malaysia (Department of Statistics, 2016). It is located in the right and west of Peninsular Malaysia and is bordered by Perak to the north, Pahang to the east, Negeri Sembilan to the South and the Straits of Malacca to the west (Figure 1.0). There are around 6.4 million of population in Selangor regarding to Department of Statistics, Malaysia. There are around 97 care home for elderly in Selangor registered with Social Welfare Department, Malaysia.

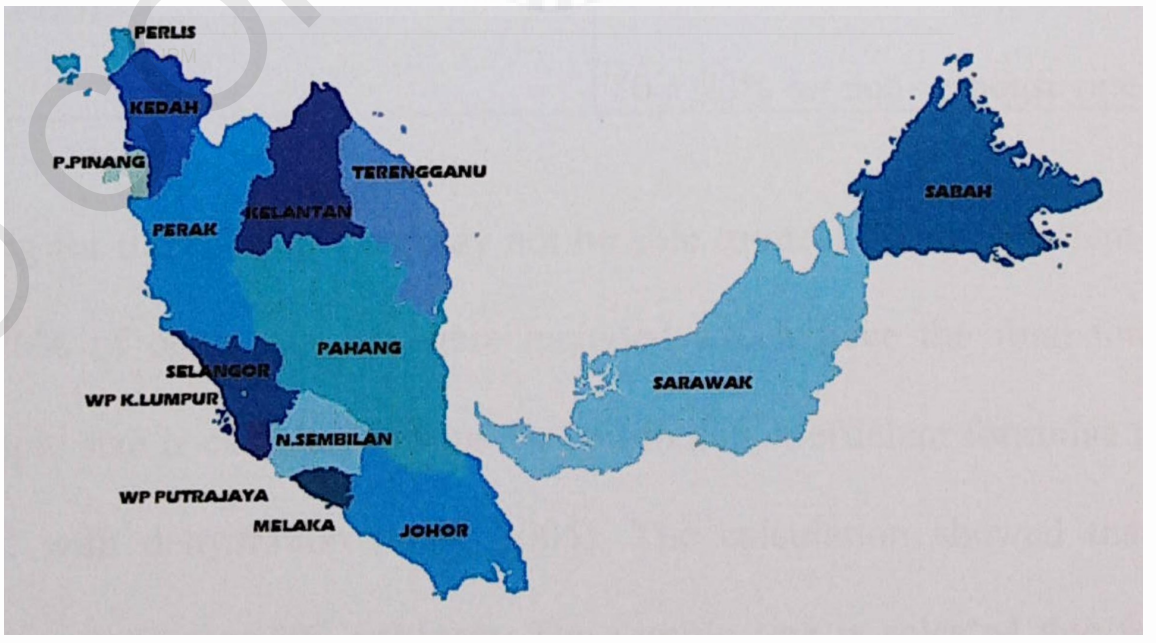

Figure 2.1: Malaysia Maps

3.3 SAMPLE SIZE DETERMINATION

$$C = 0.5 * \ln [(1+r) / (1-r)]$$

$$N = [(Z\alpha+Z\beta) / C]2 + 3$$

The sample size needed in this study was determined using the following formula: where;

$\alpha = Z\alpha = 1.96$ $\beta = Z\beta = 0.84$ r = the expected correlation coefficient

(Hulley, Cummings, Browner, Grady & Newman, 2013)

Malnutrition and Functional Status (Fonseca et al., 2016)

Table 2.1: Sample Size Calculation

Correlation studies	Correlation, d*	Sample Size, n
Body water weight and visuospatial skills (Hall, 2005)	r = 0.33	C= 0.5*ln [(1+0.33) / (1-0.33)] = 0.34 n = [(1.96 + 0.84)/0.34]^2 + 3= 71 71 + 20% for non-response rate = 85
Body water weight and memory processing and attention (Hall, 2005)	r = 0.29	C= 0.5*ln [(1+0.29) / (1-0.29)] = 0.30 n = [(1.96 + 0.84)/0.30]^2 + 3= 90 90 + 20% for non-response rate = 108
Cognitive and total water intake (Khan et al., 2015)	r = -0.31	C= 0.5*ln [(1-0.31) / (1+0.31)] = 0.32 n = [(1.96 + 0.84)/0.32]^2 + 3= 80 80 + 20% for non-response rate = 96

Considering for the subjects that may not be able to meet the requirement during the data collection, 20% of other subjects were included which gave the final total are 108 subjects. The sample size is calculated using the correlation coefficient formulae to obtained factors associated with dehydration (Hall, 2005). The calculation showed that the total sample size for this study was **108 subjects**. The sample size is selected due few reasons such as the time for the data collection is limited.

3.4 SAMPLING METHOD

The sampling method used in this present study was purposive sampling method. Firstly, the list of all eighty seven private care homes in Selangor those registered under the Department Social Welfare were list out. The care homes who had a large population size was purposely selected. However, only ten care homes gave their permission to do a research. The chart below show the process of purposive sampling.

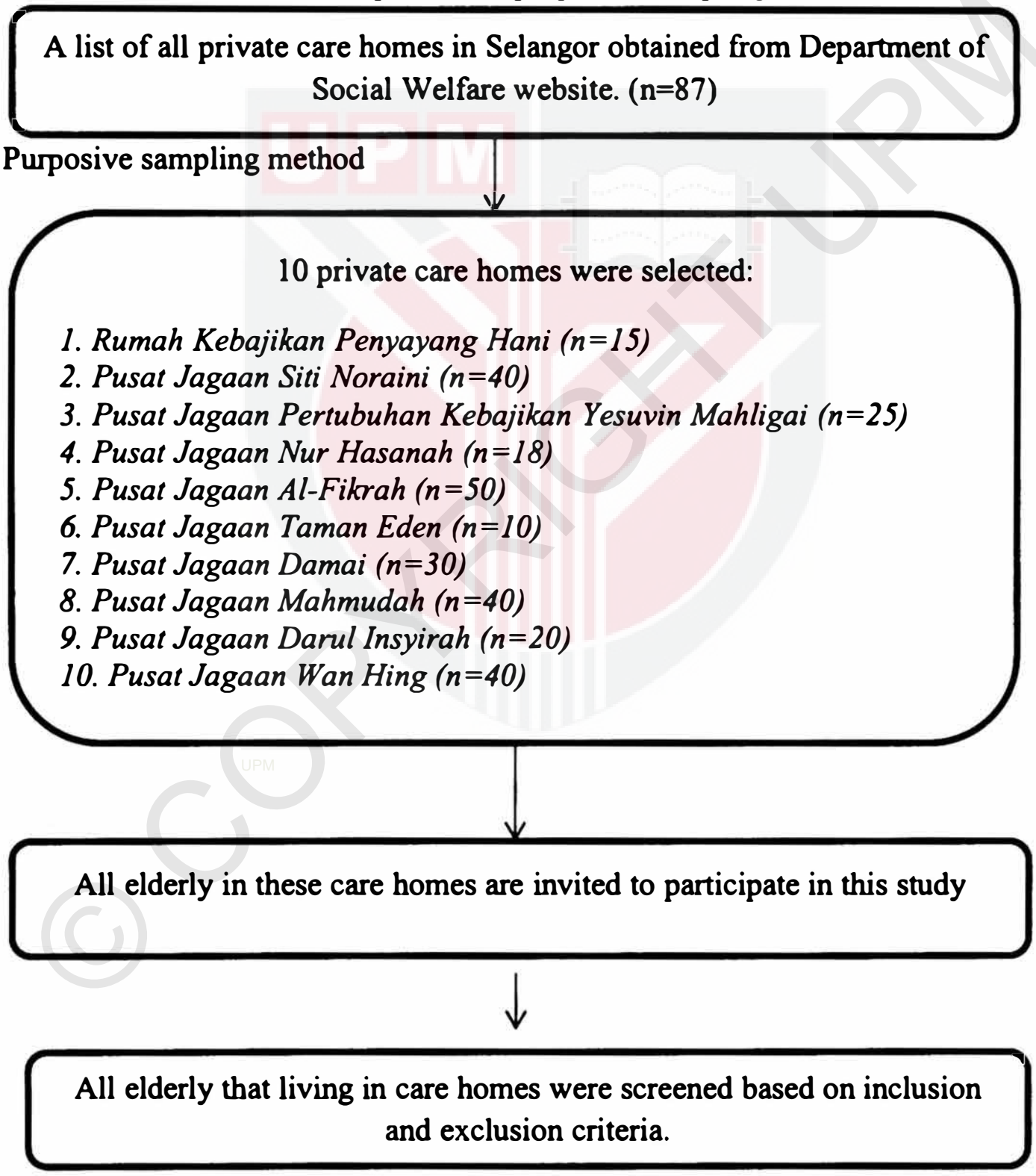

Figure 3.1: Flowchart of sampling design

3.5 STUDY SUBJECTS

The subjects for this study are elderly person at selected private care homes in Selangor. The inclusion and exclusion criteria are as follow. The subjects must 60 years old and above including male and female. They are Malaysian citizen. The exclusion criteria is people with certain medical condition such as mental illness and also cannot communicate in Malay, Chinese or English.

3.6 RESEARCH INSTRUMENT

3.6.1 Socio-demographic

Socio-demographic data was taken by giving questionnaire to the subjects. Subjects can choose to self-administered or by interview. Element that include in socio-demographic questions are age, sex, ethnicity, marital status, past occupation and educational level.

3.6.2 Anthropometric Measurement

The anthropometric measurement that needs to be assessed includes the height, weight and BMI. All the data for this part were filled up by the researcher. Height and weight of the subjects need to be measured to calculate the BMI of the subject. The tool used to measure height is calibrated SECA213 portable Stadiometer and is measured to the nearest 0.1 cm. The height taking need to be repeated for three times and average was calculated. The tool used to measure weight is calibrated TANITA Inner Scan Body Composition BC-541 and is measured to the nearest 0.1 kg.

The subjects were asked to leave all the heavy stuff they wear and should wear the light outfit. Adjust hairstyles and remove hair accessories. The subjects were asked to stand on the stadiometer, facing forwards as straight as possible. Their feet should be flat and

positioned slightly apart, in line with their hips. The head of subject must in the "Frankfort plane" which eye and ear in midline position (NIHR Southampton Biomedical Research Centre Procedure for Measuring, 2016). For the subject who was unable to stand, Knee Height (KH) measurement was done. Knee height was measured using flexible tape while the knee and ankle joints were flexed at 90°, measured between landing point and suprapatella point from lateral side. The KH formula, Suzanna & Ng (2003):

Men: (1.924 x KH) + 69.38
Women: (2.225 x KH) + 50.25

If the patient is bed-ridden or unable to stand, we can use Buckley Formula to measure the weight,

Male ABW (kg) = -47.8 + 0.78 x (Abdominal Circumference) + 1.06 x (Thigh Circumference)
Female ABW = -40.2 + 0.47 x (AC) + 1.30 x (TC)

ABW : Actual Body Weight

After the data for the weight and height of the subject is obtained, the BMI was calculated. The formula for BMI calculation was weight (kg) divided by height (m2). Based on WHO (2004), the recommended BMI cut-off points is shown in Table 3.1.

Table 3.1: BMI cut-off points

BMI cut-off points (kg/m2)	Body weight classification
<18.5	Underweight
18.5-24.9	Normal
25.0-29.9	Overweight
>30.0	Obese

3.6.3 Mini Mental State Examination

The Mini Mental State Examination (MMSE) is a tool that can be used to systematically and thoroughly assess mental status. It was an 11 question measure that tests five areas of cognitive function: orientation, registration, attention and calculation, recall, and language. The maximum score was 30. A score of 23 or lower is indicative of cognitive impairment. The MMSE takes only 5-10 minutes to administer and is therefore practical to use repeatedly and routinely (Ridha & Rossor, 2005).

Assessment of an older adult's cognitive function was best achieved when it is done routinely, systematically and thoroughly (Ridha & Rossor, 2005). The MMSE has been validated and extensively used in both clinical practice and research since 1975.

The limitation is the tool was not able to diagnose the case for changes in cognitive function and should not replace a complete clinical assessment of mental status. Next, the instrument relies heavily on verbal response and reading and writing. Therefore, patients that are hearing and visually impaired, intubated, have low English literacy, or those with other communication disorders may perform poorly even when cognitively intact (Ridha & Rossor, 2005).

3.6.4 Activities of Daily Living Scale (ADL)

The Katz Index of Independence in Activities of Daily Living, commonly referred to as the Katz ADL, is the most appropriate instrument to assess functional status as a measurement of the client's ability to perform activities of daily living independently (Mccabe, 2019). Clinicians typically use the tool to assess function and detect problems in performing activities of daily living and to plan care accordingly (Mccabe, 2019).

The Index ranks adequacy of performance in the six functions of bathing, dressing, toileting, transferring, continence, and feeding. Clients are scored yes/no for independence in each of the six functions. A score of 6 indicates full function, 4 indicate moderate impairment, and 2 or less indicates severe functional impairment (Mccabe, 2019).

The instrument is used effectively among older adults in the community and all care settings. The tool is most useful when baseline measurements are taken when the client is well and compared to periodic or subsequent measures (Mccabe, 2019).

The Katz tool was originally developed in the late 1950s, it has been modified and simplified and different approaches to scoring have been used. However, it has consistently demonstrated its utility in evaluating functional status in the elderly population. Although no formal reliability and validity reports could be found in the literature, the tool is used extensively as a flag signalling functional capabilities of older adults in clinical and home environments (Mccabe, 2019)

3.6.5 Dehydration Screening Tool

Dehydration screening tool (DST) can be use to access hydration status in elderly people. DST was developed by Vivanti et al. (2010). DST was build based on 11 items (four physical signs of dehydration and seven questions about thirst sensation, pain and mobility), with added four extra questions about drinking habits (Rodrigues, Severo, et al., 2015). Based on the questions listed subject only need to answer 'yes' or 'no' for every questions. For this sign purpose, 1 point represent the present of hydration sign.

Two factors emerged from factor analysis, which were named Hydration Score and Pain Score. Hydration Score consisting of five questions about thirst sensation and

preferences related to fluid consumption, while Pain Score, consisting of five items about mobility and pain. 1 point was assigned to items that described the absence of a characteristic or symptom related to dehydration and no points if the characteristic or symptom was present (Rodrigues, Silva, Severo, Inácio, & Padrão, 2015).

3.7 ETHICAL APPROVAL

The ethical approval has been obtained from Ethics Committee for Research Involving Human Subjects, University Putra Malaysia (JKEUPM). JKEUPM is the organization under UPM that control and protect the researcher doing the researched if any unintentional or wrongdoing towards human in research. As this researched was conducted in the selected private care home settings, the approval from Ministry of Health (MOH) is needed. For this study, the consent form was developed to give to the subjects before they agree to participate in this research. This was a crucial part so that the privacy and confidentiality of each of the subjects are protected.

3.8 DATA COLLECTION

Before the data collection, the research was well brief to the stakeholders. They were assisted to deal with the subjects. The data collection was done almost three weeks, Then, the subjects were approached by the interviewer to get a clear picture of what was the study all about and what was been done during the session of data collection. After the subjects agree to participate, the subjects were given the consent form. The research only proceeds to the subjects that fill in the consent form only.

3.9 DATA ANALYSIS

The data collected was analysed using SPSS version 21 to conduct the statistical analysis. For this data, univariate analysis was used to analyse descriptive data and the results were presented as frequencies and percentages for categorical data and as means and standard deviations for continuous variable. Association between the variables were analysed using categorical and pearson correlation for continuous data. The level of statistical significant was set at $p<0.05$.

CHAPTER 4

4 RESULTS

4.1 Recruitment and Response Rate

There are about 10 care homes that were selected to involve in this study. There were chose by purposive sampling method. Most of the subjects involve were in Siti Noraini Care Homes (18.4%), Mahmudah Care Homes (16.7%) and also Wan Hing Care Homes (13.2%). From that 10 care homes, there are around 273 subjects were selected. After screened by inclusion and exclusion criteria, there were only 141 of subjects could be the subjects. Then the number of subjects drops to 114 and contribute to the Figure 4.1 that shown below.

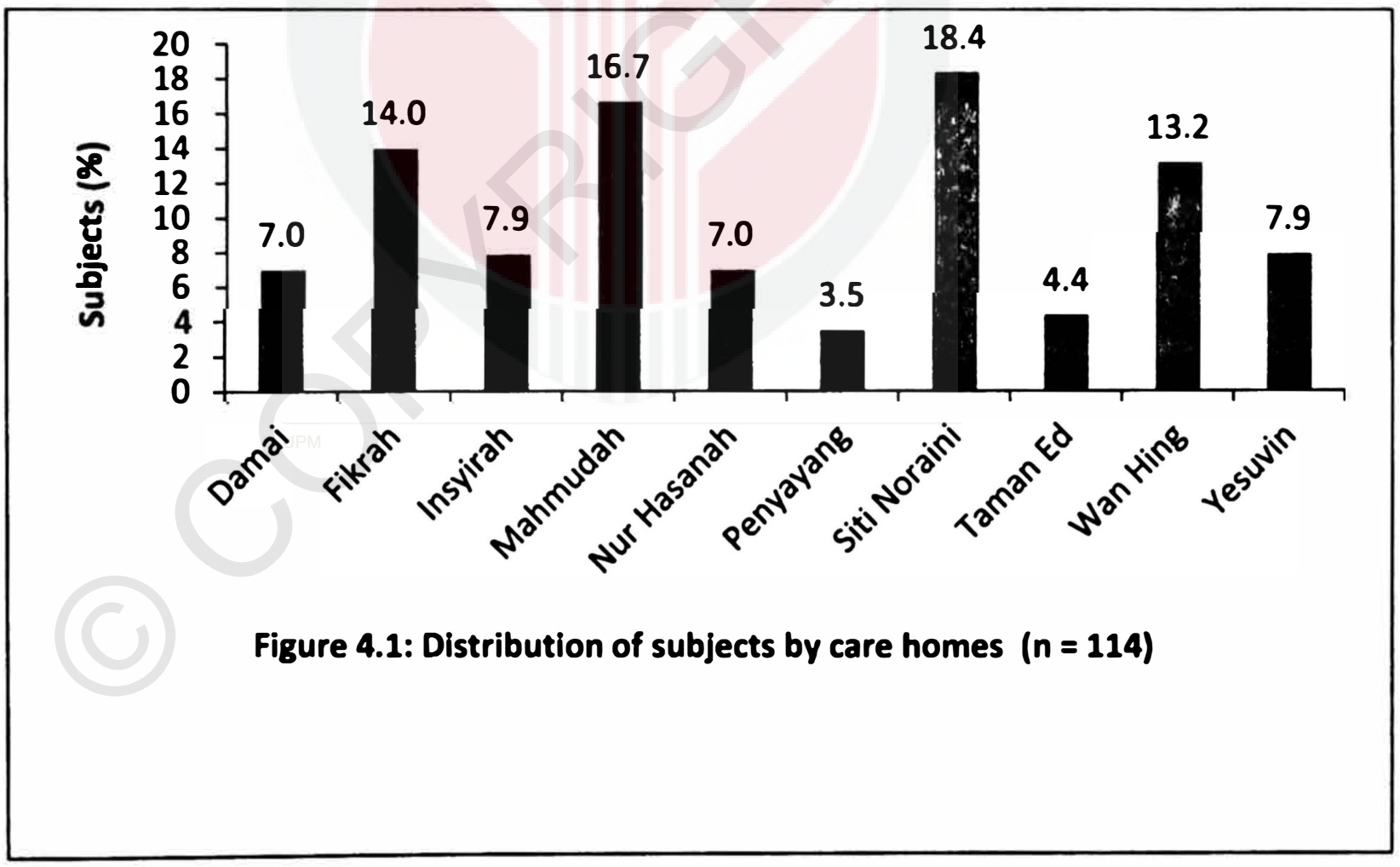

Figure 4.1: Distribution of subjects by care homes (n = 114)

4.2 Sociodemographic factors

The socio-demographic characteristics of respondents are described in Table 4.1 A total of 114 subjects were dominant by male (64.0%), mean age 70 ± 7 and most of the respondents are Malay (58.8%). Besides, the higher marital status of the subjects were married (39.5%). In addition, for education level, half of the subjects future their study until secondary school (50.9%).

Table 4.1: Socio-demographic characteristics of the subjects

Variables	n (%)	Mean ± SD	(Min-Max) value
Age		70 ± 7	60-89
Sex			
Male	73 (64.0)		
Female	41 (36.0)		
Ethnicity			
Malay	67 (58.8)		
Chinese	22 (19.3)		
Indian	25 (21.9)		
Marital status			
Single	32 (28.1)		
Married	45 (39.5)		
Divorced	12 (10.5)		
Widowed	25 (21.9)		
Education level			
None	17 (14.9)		
Primary	31 (27.2)		
Secondary	58 (50.9)		
Diploma	5 (4.4)		
Bachelor's	3 (2.6)		
Previous occupation			
None	14 (12.3)		
Government sector	24 (21.1)		
Non-government sector	30 (26.3)		
Self-employed sector	34 (29.8)		
Others	12 (10.5)		
Period admission in the care home (months)		24.54 ± 27.57	1.00-120.00
Monthly expenses			
<RM 100	76 (66.7)		
RM101-RM300	5 (4.4)		
RM301-RM500	5 (4.4)		
RM501-RM700	3 (2.6)		
RM701-RM900	6 (5.3)		
>RM900	19 (16.7)		

Majority of the subjects were involve in self-employed sector in their previous occupation (29.8%). Mean period admission in the care home, month 24.54 ± 27.57. Moreover most of the subjects spend their monthly expenses below that RM100 (66.7%).

4.3 Body weight status

Body weight status of subjects was tabulated in Table 4.2. The mean of weight and height were (58.33 ± 14.00) kg and (1.57 ± 0.12) m respectively. The mean BMI of the subjects was 23.62 ± 5.78 kg/m^2 which was fall under the normal category. Almost half of the subjects were in normal BMI classification (48.2%).

Table 4.2: Body weight status, fluid intake, cognitive status and functional status of the subjects

Variables	n (%)	Mean ± SD	(Min-Max) value
Weight (kg)		58.33 ± 14.00	25.30-98.00
Height (m)		1.57 ± 0.12	1.28-1.78
BMI (kg/m^2)		23.62 ± 5.78	10.26-45.41
Underweight (<18.5)	19 (16.7)		
Normal (18.5-24.9)	55 (48.2)		
Overweight (25.0-29.9)	27 (23.7)		
Obesity (>30)	13 (11.4)		
Total glasses/day		5 ± 2	1-12
Inadequate water intake (<7 glasses)	76 (66.7)		
Adequate water intake (>8 glasses)	38 (33.3)		
Total score cognitive status		19.82 ± 8.57	0-30
Severe cognitive impairment (<10)	17 (14.9)		
Moderate cognitive impairment (10-19)	32 (28.1)		
Mild cognitive impairment (20-25)	32 (28.1)		
Normal cognition (>26)	33 (28.9)		
Total score functional status		5.15 ± 1.61	0-6
Severe functional impairment (<2)	11 (9.6)		
Moderate functional impairment (3-4)	10 (8.8)		
Full function (>5)	93 (81.6)		

4.4 Fluid intake

Fluid intake was accessed by assessment of water intake of subjects per day. Table 4.2 showed that majority of the subjects consumed inadequate water intake which is less that 8 glasses per day (66.7%). Care homes need to make sure that they should manage to give better access for the elderly to get enough water.

4.5 Cognitive status

Table 4.2 showed cognitive status of subjects 71.1% of subjects showed having cognitive impairment which the mark that they get from total of 30 marks lesser that 26 marks. This showed that elderly had high problem in cognitive status. Care homes need to manage elderly psychology efficiently by having more program to give them motivation and positive vibe.

4.6 Functional status

Table 4.2 showed functional status of subjects. Majority of the subjects was in normal status because they are classify in full function status which their marks is higher that 5 (81.6%). The main reason why the result showed that the subjects were in good functional status because of we exclude subjects that critically ill.

4.7 Prevalence of dehydration

The prevalence of dehydration and its severity was measured by dehydration screening tools. The mean score of dehydration was 2.16 ± 1.44 indicating mild dehydration. Table 4.3 showed prevalence of dehydration. Majority of the subjects showed that they are in dehydrated status (67.5%). Only 32.5% of subjects were in no dehydration status.

Table 4.3: Prevalence of dehydration

Variables	n (%)	Mean ± SD	(Min-Max) value
Total		2.16 ± 1.44	0-6
Good hydration (<1)	37 (32.5)		
Mild dehydration (2-3)	58 (50.8)		
Moderate dehydration (4-5)	17 (14.9)		
Severe dehydration (>6)	2 (1.8)		

4.8 Association factors with dehydration

Table 4.4 showed the factors associated between dehydration. Factors that associated with dehydration was total glasses drink per day ($r = -0.247$, $p < 0.008$). The other factors showed no association with dehydration which are socio-demographic (age, period admission), body weight status, fluid intake, cognitive status and functional status.

Table 4.4: Association between socio-demographic, body weight status, functional status and cognitive status with dehydration

Variable	n (%)	r-value	p-value
Age		-0.143	0.128
Period admission		0.063	0.505
Weight		-0.100	0.289
Height		-0.023	0.807
BMI		-0.123	0.193
Total glasses drink/day		-0.247	0.008**
Total cognitive score		-0.126	0.182
Total functional score		0.100	0.290

Pearson Correlation Coefficient Test

** Correlation is significant at the 0.01 level

Table 4.5 showed the factors associated between dehydration. The test used was chi-square test. Factor that associated with dehydration was previous occupation (x^2=0.002, p<0.001). However, there was no association between sex (p=0.836), ethnicity (p=0.554), marital status (p=0.396), education level (p=0.244), monthy expenses (p=0.380) with dehydration.

Table 4.5: Association between sex, ethnicity, marital status, education level, previous occupation and monthly expense with dehydration

Variable	Categories of Dehydration (n=114)		X^2	p-value
	Good hydration, n (%)	Dehydrated, n (%)		
Sex			0.773	0.836
Male	23 (31.5)	50 (68.5)		
Female	14 (34.1)	27 (65.9)		
Ethnicity			0.549	0.554
Malay	23 (34.3)	44 (65.7)		
Chinese	5 (22.7)	17 (77.3)		
Indian	9 (36.0)	16 (64.0)		
Marital Status			0.379	0.396
Single	9 (24.3)	23 (29.9)		
Married	18 (48.6)	27 (35.1)		
Divorced	10 (27.0)	27 (35.1)		
Education level			0.236	0.244
None	3 (8.1)	14 (18.2)		
Secondary and below	30 (81.1)	59 (76.6)		
Tertiary and above	4 (10.8)	4 (5.2)		
Previous occupation			0.002	0.001
Government sector	3 (8.1)	21 (27.3)		
Non-government sector	17 (45.9)	13 (16.9)		
Others	17 (45.9)	43 (55.8)		
Monthly expenses			0.346	0.380
<RM100	28 (75.7)	48 (62.3)		
RM101-RM900	5 (13.5)	14 (18.2)		
>RM900	4 (10.8)	15 (19.5)		

Chi-square test

** Correlation is significant at the 0.01 level

Table 4.6 showed the factors associated between dehydration. The test used was chi-square test. There are no association between body weight status (p=0.095), water intake (p=0.292), cognitive status (p=0.660) and functional status (0.608) with dehydration.

Table 4.6: Association between body weight status, fluid intake, cognitive status and functional status with dehydration

Variable	Categories of Dehydration		X^2	p-value
	Good dehydration, n(%)	Dehydrated, n(%)		
Categories of BMI			0.096	0.095
Underweight	4 (10.8)	16 (20.8)		
Normal	14 (37.8)	37 (48.1)		
Overweight and obesity	19 (51.4)	24 (31.2)		
Categories of water intake			0.258	0.292
Inadequate water intake	22 (28.9)	54 (71.1)		
Adequate water intake	15 (39.5)	23 (60.5)		
Categories of cognitive status			0.570	0.660
Normal	12 (32.4)	21 (27.3)		
Decline	25 (67.6)	56 (72.7)		
Categories of functional status			0.541	0.608
Full function	29 (78.4)	64 (83.1)		
Decline function	8 (21.6)	13 (16.9)		

Chi-square test

** Correlation is significant at the 0.01 level

CHAPTER 5

5 DISCUSSION

5.1 Prevalence of dehydration

Results from this study showed 67.5 % out of 114 subjects were having dehydration. Hooper et al (2013) stated that 20 – 30 % elderly at Notfolk, United Kingdom was in dehydration status using cross-sectional studies. Moreover, NHANES III cohort data show 28% of elderly was in dehydrated status. Besides, Geriatric and Rehabilitation Unit (GARU) found that the dehydration prevalence of subject on admission was 16.3%. Next, Dehydration Recognition In our Elders (DRIE) stated that the subjects included 188 subjects of whom 20% were dehydrated. This study showed that the prevalence of dehydration among elderly incare homes in Selangor was higher.

5.2 Factors associated with dehydration

5.2.1 Socio-demographic

This study found no significant association between sex and dehydration similar with previous study that state dehydration had no significant differences between sexes (Rodrigues, Severo, & Lopes, 2015). Study from SENECA proves that women were higher in getting dehydration which was 21–65% compare to men that contribute only 13–42%. But there are difference in study from Stookey (2005) that stated men were higher in getting dehydration which were 23 % compare to women 16%. In this study, when we focusing by categories of sex the number of dehydrated subjects for both sexes were three times higher.

However in this study, the contradict result only could explained by the imbalance of male and female subjects who participated the study. Total male subjects were two times higher comparing to female subjects who could cause no significant association found between sex and dehydration.

This study found no significant association between ethnicity and dehydration similar with previous study that state so (Bunn, Jimoh, & Howard, 2015). No study stated that ethnicity is associated with dehydration. Habitual to have water intake were not differentiate between ethnicity because it is sense of human being either they are in different ethnic.

Next, this study found no significant association between marital status and dehydration similar with previous study that state that there was no significant difference between marital status and dehydration (Bunn, Jimoh, & Howard, 2015). Marital status not be the one that could associated with dehydration because most of the subjects are in single status when living at the care homes. Although they not have any spouse to take care of them but in the care homes there are many care taker could take care of them and give them moral support.

Besides, this study found no significant association between educational level and dehydration similar with previous study that state so (Rodrigues, Severo, & Lopes, 2015). Different level of educational level show different level of knowledge of individual. Lack of knowledge may cause them to said that it is harmless when going often to the toilet, so they not drinking enough (Hooper et al., 2014). But apart from the situation, taste of thirsty could not avoid someone to drink water, not really related with education.

Then, this study found significant association between previous occupation and dehydration contradict with previous study that state there are no significant differences

between previous occupations with dehydration (Jette et al., 1986). But some study state that the result similar with previous study that state dehydration had significant with previous occupation due to environmental temperatures, humid and hot tropical or hot and dry which is extremes in temperature (Bouchet et al., 2000; Parkerson et al., 1990).

Lastly, this study found no significant association between monthly expenses and dehydration. Some care homes need to pay before we can enter it, but some care homes are open for living without need to pay any with support of government and charity. Due to that situation, all of them will surely get enough food consumption, especially for water intake.

5.2.2 Body weight status

This study found no significant association between body weight status and dehydration contradict with previous study that state measuring body weight status was accepted process for the confirmation of dehydration (Weinberg and Minaker, 1995; Murphy, 1998). This also support with previous study that state body weights decreased significantly during dehydration, reflecting fluid loss (Ship & Fischer, 1997) and also contradict with another study that state severe dehydration should be considered if the body weight rapidly decreases) (Bak, Tsiami, & Greene, 2017).

But some study have similar result with present study that stated dehydration not significantly different between groups with BMI (Rodrigues, Severo, & Lopes, 2015). Body weight was poor indicator of hydration among the elderly (Nessa & Johnson, 2010). The method is only reliable for short periods of time during which the potential amount of adipose tissue loss and also immediately influenced by the weight of foods consumed, so this assessment method needs to ensure that the measurements are taken at the same times during

the day (Bak et al., 2017). This method is not useful for measuring chronic hydration (Hall, 2005).

5.2.3 Fluid intake

This study found significant association between fluid intake and dehydration similar with previous study because the study stated that a simple and appropriate approach to assess hydration status is monitoring fluid intake that focused on water consumption (Gasper, 1999). Water intake must be higher than 1700 ml approximately equal to eight glasses that should take every day.

Liquid made the greater contribution for human to stay in hydration status and for that reason reduced water intake could cause dehydration (Hooper, 2015). Water loss or dehydration is due to insufficient fluid intake (Hooper et al., 2014). Water is the type of drink used to rehydrate it is also a variable to take into account. The benefit of using only water to determine the effects of dehydration on cognitive performance because it is the most widespread beverage (Adan & Adan, 2012).

5.2.4 Cognitive status

This study found no significant association between cognitive status and dehydration contradict with previous study that state 34% of those with cognitive impairment current dehydration, significantly more than the 14% of those with less impaired cognition (Seymour et al., 1980). The previous study was supported by Simmons et al. (2001) that conclude the more cognitively impaired individuals the more they tend to drink more, but the less cognitively impaired only did so if given their fluid of choice.

Both of the previous study state that elderly that have cognitive impairment still can think better to consume fluid, but the previous study was contradict from Namasivayam-MacDonald et al,. (2018) that stated moderate to severe cognitive impairment resulted in a decrease in fluid intake. This shows the real problem because the study was recently.

In general, older adults who are challenged by cognitive decline are at increased risk for dehydration and the infections (Collins & Claros, 2011; Easterling & Robbins, 2008; Ferry, 2005; Mentes, 2006; Suhayda & Walton, 2002). Care taker in the care homes should give their focus for the health of the elderly so although the elderly had decline in cognitive they still will eat and drink similar with other healthy elderly (D. Fonda et al., 1994)

5.2.5 Functional status

This study found no significant association between functional status and dehydration which contradict with previous study that states incontinence leading to deliberate poor intake of fluids that makes them dehydrated (Steward et al. 2009). The reason why the study state that functional status were associated with dehydration because functional disability and physical impairment were barriers to accessing fluids with a resultant increased dependence upon care-givers (Spencer et al., 2000).

But this study was similar with other study that stated that the result cannot support functional status were associated with dehydration (Hooper et al., 2018). Majority of the subjects were in full function condition. They do not have any problem to move by themselves and having enough water.

CHAPTER 6

6 CONCLUSION AND RECOMMENDATION

6.1 Conclusion

In conclusion, this study showed that prevalence of dehydration among elderly in care homes were relatively higher compared to other worldwide study. There are only two variables were found to be significant associated with dehydration; previous occupation (x^2 = 0.002, $p < 0.001$) and water intake ($r = -0.247$, $p < 0.008$). No association were found under other socio-demographic (age, period admission, ethnicity, marital status, educational level, monthly expenses), body weight status, cognitive status and functional status. Future study needs to be done to investigate more details about the factors and the prevention of dehydration problem among elderly.

6.2 Limitation

There were some study limitation that should be considered in order for more details and precise result to be obtained. First, the interviewer had low expertise in measuring body measure especially using surrogate tools. So we can lower the error. Secondly, the subjects need more time to answer the questions. That cause the subjects loss their focus when answering the questionnaires. Thirdly, the interviewer had low experience in conducting face to face interview. It is expect that the subject can answer the questionnaire by themselves but after facing the real situation most of them cannot read and it make the interviewer need to change the way to collect data. Besides, the limitations of obtaining fluid intake data are well known. It show underestimated fluid intake because we are focusing only for water intake.

6.3 Recommendation

There are some recommendation that could be suggested for future research implemetation. Firstly, before doing the collection data we need to prepare and train well using the measuring body. It will help us to get the most accurate reading. Secondly, interviewer need to do extra activity when collecting data with the elderly. It will help to attract them to give their focus and answer the questionnaire. Thirdly, when having face to face interview, interviwer need to ask very detail to make sure that thare is no bias answer from the interviewer. Moreover, further studies should investigate how drinking habits influence real-world settings, particularly for tasks that require a multitude of cognitive processes at once(Masento, Golightly, Field, Butler, & Van Reekum, 2014). Besides we need to improve knowledge of the care takers about dehydration. It will help them to monitor every single person who were living in the care homes with proper method.

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APPENDIX A

ETHICS COMMITTEE FOR RESEARCH INVOLVING HUMAN SUBJECTS (JKEUPM)
UNIVERSITI PUTRA MALAYSIA

Research title	:	**Prevalence and Factors Associated with Dehydration Among Elderly at Selected Private Care Homes in Hulu Langat, Selangor**
Study Site	:	**Selangor**
JKEUPM Ref No.	:	**JKEUPM-2018-439**
Researcher	:	**Nabil bin Mazri**
Supervisor	:	**Dr. Noraida binti Omar**

Documents received and reviewed with reference to the above study:

1. Ethics Application Form, Version 1 dated 14/12/2018
2. Respondent Information Sheet & Guardian's /Parent's Consent (English), Version 2 dated 9/1/2019
3. Respondent Information Sheet & Consent (English), Version 2 dated 9/1/2019
4. Proposal (English), Version 2 dated 8/2/2019
5. Questionnaires/ Interviews (English), Version 1 dated 14/12/2018
6. Curriculum Vitae of:
    a. Dr. Noraida binti Omar

The University Research Ethics Committee, Universiti Putra Malaysia (JKEUPM) operates in accordance to the ICH-GCP Guidelines.

Decision by JKEUPM:

[X] Approved

[ ] **Permission MUST BE OBTAINED from the respective hospitals/ institutions before conducting the research**

[ ] Disapproved

Please note that the approval is **VALID UNTIL 19 FEBRUARY 2020**

Researchers should comply with the following:

I. Complete a Study Final Report upon study completion (Form 3.2).

II. Ethical approval is required in the case of amendments/ changes to the study documents/ study sites/ study team.

III. Applicable for Clinical Trial Studies and Clinical interventional Studies only: Progress Report has to be submitted to JKEUPM at every 6 months from the date of approval (Form 3.1). Report

APPENDIX B

Lampiran:
s.k,

1 Rumah Kebajikan Penyayang Hati
No 38, Jalan Bangi Villa 3,
Taman Bangi Villa Kajang,
43000, Hulu Langat Selangor.

2 Pusat Jagaan Siti Norainі
No 23, Jalan Maju 2,
Taman Maju Klang,
Jalan Semenyih Kajang
43000 Hulu Langat. Selangor.

3 Pusat Jagaan Pertubuhan Yesuvm Mahligai (YM)
No 66. Jalan Maju 7,
Taman Maju 2,
Off Jalan Semenyih
43000 Kajang. Selangor.

4 Pusat Jagaan Nur Hasanah
Lot 842. Lorong Dato' Dagang Hj Tahir
Kg Sesapan Kelubi
43700 Beranang Hulu Langat
Selangor.

5 Pusat Jagaan Al-Fikrah
Kampung Sungai Sekamat
43000 Kajang. Selangor.

6 Pusat Jagaan Taman Eden
Lot 2286, Jalan 5
Kajang. Selangor

7 Pusat Jagaan Damai
No 24, Jalan Damai Perdana 2/6F
Bandar Damai Perdana
56000 Cheras
Kuala Lumpur, Hulu Langat
Selangor

8 Pusat Jagaan Mahmudah
Lot 459/5, Jalan 1 Off
Jalan Bangi Lama
Kampung Sungai Purun
43500 Semenyih, Selangor

9 Pusat Jagaan & Pendidikan Warga Emas Darul Insyirah
No 72 Jalan Melati
Bangi Golf Resort
43650 Bangi
Selangor

10 Pusat Jagaan Wan Hing
68, Jalan Raya 5
Taman Sri Andalas
43300 Seri Kembangan
Selangor

BORANG PERSETUJUAN BAGI PERMOHONAN MENJALANKAN KAJIAN DI PUSAT JAGAAN WARGA EMAS

Tajuk penyelidikan: *Prevalence of Constipation and Dehydration and its Associated Factors Among Elderly at Selected Private Care Homes in Hulu Langat, Selangor*

Butiran penyelidik:

Nama: 1) Dr Norsuzila Omar (Ketua Penyelidik/Penyarah Kanan)
2) Cik Maliza binti Emril
3) En Nabil bin Mazni

Jabatan: Jabatan Pemakanan dan Dietetik, Fakulti Perubatan dan Sains Kesihatan, UPM

Saya _____ dengan ini membuat keputusan seperti berikut:
(Nama Pusat Jagaan Warga Emas)

☐ Membenarkan projek penyelidikan dijalankan

☐ Tidak membenarkan projek penyelidikan dijalankan

Sila kembalikan borang persetujuan ini kepada Cik Maliza binti Emril di talian 014-6508111 atau emelkan kepada maliza_emril@yahoo.com

"BERKHIDMAT UNTUK NEGARA"

Saya yang menurut perintah,

(Pusat Jagaan Warga Emas yang berkenaan)

APPENDIX C

No rujukan:

UNIVERSITI PUTRA MALAYSIA

BERILMU BERBAKTI

FAKULTI PERUBATAN DAN SAINS KESIHATAN

JABATAN PEMAKANAN DAN DIETETIK

BORANG SOAL SELIDIK

Tajuk :

Prevalen And Faktor Yang Berkaitan Dengan Dehidrasi Dalam Kalangan Orang Tua Di Rumah Penjagaan Swasta Di Selangor

Penyelidik :

No	Nama	No matrik	Program
01	Nabil Bin Mazri	183520	B.Sc. Pemakanan dan Kesihatan Komuniti

Penyelia :

Dr Noraida Binti Omar

Tarikh pengumpulan maklumat:

Soal selidik ini hanya bertujuan untuk penyelidikan. Segala maklumat yang yang dikumpulkan dalam borang soal selidik ini akan dirahsiakan dan tidak didedahkan kepada sesiapa. Penyertaan dan kerjasama anda amatlah dihargai.

BAHAGIAN A: MAKLUMAT PERIBADI

Sila isikan maklumat di bawah dan tandakan "√" pada kotak yang berkaitan.

Umur	_____ tahun
Jantina	☐ Lelaki ☐ Perempuan
Kaum	☐ Melayu ☐ Cina ☐ India ☐ Lain-lain (Nyatakan): .....
Status perkahwinan	☐ Bujang ☐ Berkahwin ☐ Bercerai ☐ Kematian suami/isteri
Taraf pendidikan	☐ Tiada ☐ Sekolah rendah ☐ Sekolah menengah ☐ Diploma ☐ Ijazah ☐ Ijazah sarjana ☐ PhD
Pekerjaan dahulu	☐ Tiada ☐ Kakitangan kerajaan ☐ Kakitangan swasta ☐ Bekerja sendiri ☐ Lain-lain (Nyatakan): .....
Tempoh menetap di pusat jagaan	_____ tahun _____ bulan
Perbelanjaan bulanan	☐ <RM 100 ☐ RM 101- RM 300 ☐ RM 301- RM 500 ☐ RM 501- RM 700 ☐ RM 701- RM 900 ☐ >RM900

BAHAGIAN B: PENGUKURAN ANTROPOMETRI

Sila isikan maklumat di bawah. Pengukuran akan dilakukan oleh penyelidik.

Berat	_____ kg
Tinggi (m)	_____ m
Indeks Jisim Tubuh (*BMI*) _____ Kg/m^2	☐ Kurang berat badan ☐ Normal ☐ Berat badan berlebihan ☐ Obesiti

BAHAGIAN C: BORANG INGATAN DIET 24 JAM

Bil	Soalan	Gelas
1	Berapa banyak gelas air yang anda minum?	

BAHAGIAN D: KEMURUNGAN DAN TAHAP STRESS

Sila baca pernyataan dibawah dan bulatkan pada nombor 0, 1, 2 atau 3 bagi menggambarkan keadaan anda sepanjang minggu yang lalu. Tiada jawapan yang betul atau salah.

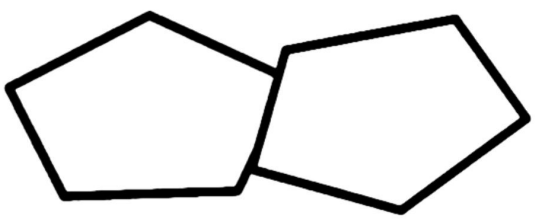
Skala pemarkahan adalah seperti berikut :

0 Tidak langsung menggambarkan diri saya
1 Sedikit atau jarang-jarang menggambarkan keadaan saya
2 Banyak atau kerapkali menggambarkan keadaan saya
3 Sangat banyak atau sangat kerap menggambarkan keadaan saya

1	Saya dapati diri saya sukar ditenteramkan	0	1	2	3
2	Saya sedar mulut saya terasa kering	0	1	2	3
3	Saya tidak dapat mengalami perasaan positif sama sekali	0	1	2	3
4	Saya mengalami kesukaran bernafas (cth: pernafasan yang laju, tercungap cungap walaupun tidak melakukan senaman fizikal)	0	1	2	3
5	Saya sukar mendapatkan semangat bagi melakukan sesuuatu perkara	0	1	2	3
6	Saya cenderung untuk bertindak keterlaluan dalam sesuatu perkara	0	1	2	3
7	Saya rasa menggeletar (contohnya pada tangan)	0	1	2	3
8	Saya rasa saya menggunakan banyak tenaga dalam keadaan cemas	0	1	2	3
9	Saya bimbang keadaan di mana saya mungkin menjadi panik dan melakukan perkara yang membodohkan diri sendiri	0	1	2	3
10	Saya rasa saya tidak mempunyai apa-apa untuk diharapkan	0	1	2	3
11	Saya dapati diri saya semakin gelisah	0	1	2	3
12	Saya rasa saya sukar untuk relaks	0	1	2	3
13	Saya rasa sedih dan murung	0	1	2	3
14	Saya tidak dapat menahan sabar dengan perkara yang menghalang saya untuk meneruskan apa yang saya lakukan	0	1	2	3
15	Saya rasa hampir-hampir menjadi panic/cemas	0	1	2	3
16	Saya tidak bersemangat dengan apa jua yang saya lakukan	0	1	2	3
17	Saya tidak begitu berharga sebagai seorang individu	0	1	2	3
18	Saya rasa yang saya mudah tersentuh	0	1	2	3
19	Saya sedar tindakbalas jantung saya walaupun tidak melakukan aktiviti fizikal (contohnya kadar denyutan jantung bertambah, atau denyutan jantung berkurangan)	0	1	2	3
20	Saya berasa takut tanpa sebab yang munasabah	0	1	2	3
21	Saya rasa hidup ini tidak bermakna	0	1	2	3

BAHAGIAN E

Sila baca pernyataan di bawah dan jawab soalan berkenaan. Tiada jawapan yang betul atau salah.

Bil	Soalan	Markah	Markah Penuh
1	Apa tahun sekarang ini? Musim? Tarikh? Hari dalam seminggu? Bulan?		5
2	Kita dimana sekarang : Daerah? Bandar? Hospital? Aras?		5
3	Pemeriksa menamakan tiga objek yang tidak berkaitan dengan jelas dan perlahan, kemudian meminta pesakit untuk menamakan ketiga-tiganya. Respons subjek digunakan untuk pemarkahan. Pemeriksa mengulangi mereka sehingga pesakit belajar semuanya, jika mungkin. Bilangan percubaan: _____		3
4	"Saya ingin anda mengira secara mundur dari 100 dengan tujuh." (93, 86, 79, 72, 65 ...). Berhenti selepas lima jawapan. Alternatif: "Eja DUNIA dari belakang." (A-I-N-U-D)		5
5	"Terdahulu saya memberitahu anda nama tiga perkara. Bolehkah anda memberitahu saya apa itu? "		3
6	Tunjukkan pesakit dua objek mudah, seperti jam tangan dan pensel, dan minta pesakit menamakannya.		2
7	"Ulangi ungkapan: 'Tidak, jika, atau, atau tetapi.'"		1
8	"Ambil kertas di tangan kanan anda, lipatkannya separuh, dan letakkan di atas lantai." (Pemeriksa memberikan pesakit sekeping kertas kosong.)		3
9	"Sila baca ini dan lakukan apa yang dikatakannya." (Petunjuk tertulis ialah "Tutup mata anda.")		1
10	Buat dan tulis ayat tentang apa-apa. "(ayat ini mesti mengandungi kata nama dan kata kerja.)		1
11	"Sila salin gambar ini." (Pemeriksa memberikan pesakit satu sekeping kertas kosong dan meminta dia untuk menarik simbol di bawahnya. Semua 10 sudut mesti hadir dan dua mesti bersilang.) 		1

BAHAGIAN F

Sila isi maklumat peribadi berikut.

AKTIVITI **MATA (1 ATAU 0)**	**INDEPENDENSI:** **(1 mata)** **Tiada pengawasan, arahan atau bantuan peribadi**	**DEPENDENSI:** **(0 POINTS)** **dengan pengawasan, arahan, bantuan peribadi atau penjagaan menyeluruh**
MANDI MATA:_____	(1 MATA) Mandi sepenuhnya atau memerlukan bantuan mandi hanya satu bahagian badan seperti belakang, kawasan kelamin atau hujung kaki yang kurang upaya.	(0 MATA) Perlu bantuan dengan mandi lebih daripada satu bahagian badan, masuk atau keluar dari tab mandi atau mandi. Memerlukan jumlah mandi.
PERSALINAN MATA:_____	(1 MATA) Dapat pakaian dari almari dan laci dan memakai pakaian dan pakaian luar lengkap dengan pengikat. Mungkin ada kaitan dengan kasut.	(0 MATA) Perlu bantuan dengan berpakaian sendiri atau perlu berpakaian lengkap.
GUNAKAN TANDAS MATA:_____	(1 MATA) Pergi ke tandas, masuk dan keluar, mengatur pakaian, membersihkan kawasan alat kelamin tanpa bantuan	(0 MATA) Perlu bantuan memindahkan ke tandas, membersihkan diri atau menggunakan alat bantu
MEMINDAHKAN BARANG MATA:_____	(1 MATA) Bergerak masuk dan keluar dari katil atau kerusi tanpa bantuan. Pemindahan misi mekanikal boleh diterima	(0 MATA) Perlu membantu bergerak dari tempat tidur ke kerusi atau memerlukan pemindahan lengkap.
TAHAN KENCING MATA:_____	(1 MATA) Latihan kendiri sepenuhnya terhadap kencing dan buang air besar	(0 MATA) Adalah sebahagian besar atau sama sekali tidak usus atau pundi kencing
MAKAN MATA:_____	(1 MATA) Dapatkan makanan dari pinggan ke dalam mulut tanpa bantuan. Penyediaan makanan boleh dilakukan oleh orang lain.	(0 MATA) Perlu bantuan separa atau total dengan memberi makan atau memerlukan makan parenteral.

JUMLAH MATA = _____ 6 = Tinggi (pesakit independensi) 0 = Rendah (dependendi)

BAHAGIAN G

Sila isi maklumat peribadi berikut.

BIL	SOALAN	JAWAPAN	MATA
1	Pemeriksaan lidah untuk kekeringan	Normal ☐ Kering ☐ Sangat kering ☐	0 1 2
2	Sternum skin turgor (masa menggunakan tangan kedua). Apabila mencubit, perhatikan bilangan saat untuk kulit kembali normal	0 – 1 saat ☐ 2 atau lebih ☐	0 1
3	Adakah anda pernah berasa haus?	Ya ☐ Tidak ☐	0 1
4	Adakah anda merasa dahaga semalam?	Ya ☐ Tidak ☐	0 1
5	Adakah anda mengalami kesukaran menggerakkan bahu, lengan atau tangan anda?	Ya ☐ Tidak ☐	0 1
6	Dalam 2 minggu yang lalu, adakah sakit mengganggu aktiviti harian anda?	Ya ☐ Tidak ☐	0 1
7	Dalam 2 minggu yang lalu adakah anda mempunyai masalah dengan rasa sakit apa-apa?	Ya ☐ Tidak ☐	0 1
8	Dalam 2 minggu yang lalu, adakah anda menjatuhkan sesuatu?	Ya ☐ Tidak ☐	0 1
9	Berapa kali anda mengalami sakit kepala pada minggu lalu?	Ya ☐ Tidak ☐	0 1
10	Berat (diukur) - wanita -lelaki	50 kg or lebih ☐ Kurang 50 kg ☐ 70 kg or lebih ☐ Kurang 70 kg ☐	0 1 0 1
11	Adakah anda suka minum air?	Ya ☐ Tidak ☐	0 1
12	Adakah anda biasanya minum semasa makan?	Ya ☐ Tidak ☐	0 1
13	Jika anda mempunyai beberapa minuman, anda biasanya memilih air kosong?	Ya ☐ Tidak ☐	0 1
14	Adakah anda prihatin untuk menjadi terhidrat dengan baik?	Ya ☐ Tidak ☐	0 1

APPENDIX D

No rujukan:

UNIVERSITI PUTRA MALAYSIA

BERILMU BERBAKTI

FACULTY OF MEDICINE AND HEALTH SCIENCES

DEPARTMENT OF NUTRITION AND DIETETICS

QUESTIONNAIRE FORM

Topic :

Prevalence of Dehydration and its Associated Factors among Elderly at Selected Private Care Homes in Hulu Langat, Selangor.

Researcher :

No	Name	Matric no.	Programme
1	Nabil Bin Mazri	183520	B.Sc. Nutrition and Community Health

Supervisor:

Dr Noraida Binti Omar

Date of data collection:

This questionnaire is intended only for academic purpose. All the information collected in the questionnaire form is secured by confidentially. Your participation and cooperation are greatly appreciated

PART A

Please fill in the following personal information.

ID	
Age	
Sex	☐ Male ☐ Female
Ethnicity	☐ Malay ☐ Chinese ☐ Indian ☐ Others :.....
Marital status	☐ Single ☐ Married ☐ Divorced ☐ Widowed
Education level	☐ None ☐ Primary ☐ Secondary ☐ Diploma ☐ Bachelor's ☐ Master's ☐ PhD
Past occupation	☐ None ☐ Government ☐ Non-government ☐ Self-employed ☐ Others :.....

PART B

(Fill by the researches).

Weight (kg)	
Height (m)	
Knee Height (cm)	
Abdominal Circumference (cm)	
Thigh Circumference (cm)	
Body Mass Index (kg/m^2)	☐ <18.5 ☐ 18.5-24.9 ☐ 25.0-29.9 ☐ 30.0-34.9 ☐ ≥40.0

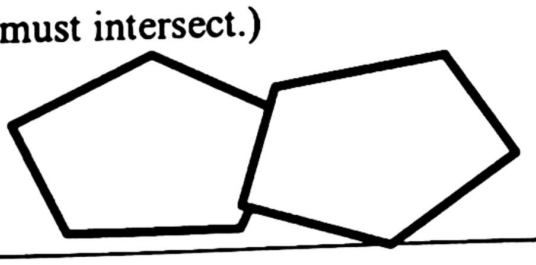
PART C

Please fill in the following personal information.

No.	Questions	Answer
1	How many glasses of water taken?	

250 **PART D**

251 Please fill in the following personal information.

No	Questions	Patient Score	Maximum Score
1	"What is the year? Season? Date? Day of the week? Month?"		5
2	"Where are we now: State? County? Town/city? Hospital? Floor?"		5
3	The examiner names three unrelated objects clearly and slowly, then asks the patient to name all three of them. The patient's response is used for scoring. The examiner repeats them until patient learns all of them, if possible. Number of trials:_____		3
4	"I would like you to count backward from 100 by sevens." (93, 86, 79, 72, 65 ...). Stop after five answers.Alternative: "Spell WORLD backwards." (D-L-R-O-W)		5
5	"Earlier I told you the names of three things. Can you tell me what those were?"		3
6	Show the patient two simple objects, such as a wristwatch and a pencil, and ask the patient to name them.		2
7	"Repeat the phrase: 'No ifs, ands, or buts.'"		1
8	"Take the paper in your right hand, fold it in half, and put it on the floor." (The examiner gives the patient a piece of blank paper.)		3
9	"Please read this and do what it says." (Written instruction is "Close your eyes.")		1
10	Make up and write a sentence about anything." (This sentence must contain a noun and a verb.)		1
11	"Please copy this picture." (The examiner gives the patient a blank piece of paper and asks him/her to draw the symbol below. All 10 angles must be present and two must intersect.) 		1

PART E

Please fill in the following personal information.

ACTIVITIES POINTS (1 OR 0)	INDEPENDENCE: (1 POINT) NO supervision, direction or personal assistance	DEPENDENCE: (0 POINTS) WITH supervision, direction, personal assistance or total care
BATHING POINTS:_____	(1 POINT) Bathes self completely or needs help in bathing only a single part of the body such as the back, genital area or disabled extremity.	(0 POINTS) Needs help with bathing more than one part of the body, getting in or out of the tub or shower. Requires total bathing.
DRESSING POINTS:_____	(1 POINT) Gets clothes from closets and drawers and puts on clothes and outer garments complete with fasteners. May have help tying shoes.	(0 POINTS) Needs help with dressing self or needs to be completely dressed.
TOILETING POINTS:_____	(1 POINT) Goes to toilet, gets on and off, arranges clothes, cleans genital area without help	(0 POINTS) Needs help transferring to the toilet, cleaning self or uses bedpan or commode.
TRANSFERRING POINTS:_____	(1 POINT) Moves in and out of bed or chair unassisted. Mechanical transferring aides are acceptable	(0 POINTS) Needs help in moving from bed to chair or requires a complete transfer.
CONTINENCE POINTS:_____	(1 POINT) Exercises complete self control over urination and defecation	(0 POINTS) Is partially or totally incontinent of bowel or bladder
FEEDING POINTS:_____	(1 POINT) Gets food from plate into mouth without help. Preparation of food may be done by another person.	(0 POINTS) Needs partial or total help with feeding or requires parenteral feeding.

TOTAL POINTS = _____ 6 = High (patient independent) 0 = Low (patient very dependent)

PART F

Please fill in the following personal information.

No	Dehydration Screening Tool (DST) Items	Answer	Coding
1	Inspection of tongue for dryness	Normal ☐ Dry ☐ Very dry ☐	0 1 2
2	Sternum skin turgor (timed using second hand). Upon pinching, note the number of seconds for skin to return to normal	0 – 1 second ☐ 2 or more seconds ☐	0 1
3	Do you ever feel thirsty?	Yes ☐ No ☐	0 1
4	Did you feel thirsty yesterday?	Yes ☐ No ☐	0 1
5	Do you have difficulty moving your shoulders, arms or hands?	Yes ☐ No ☐	0 1
6	In the past 2 weeks, did pain interfere with your daily activities?	Yes ☐ No ☐	0 1
7	In the past 2 weeks did you have problems with pain of any kind?	Yes ☐ No ☐	0 1
8	In the last 2 weeks, did you drop something?	Yes ☐ No ☐	0 1
9	How many times have you had a headache in the past week?	Yes ☐ No ☐	0 1
10	Do you like to drink water?	Yes ☐ No ☐	0 1
11	Do you usually drink at meals?	Yes ☐ No ☐	0 1
12	If you have several beverages available, do you usually choose water?	Yes ☐ No ☐	0 1
13	Are you concerned about being well hydrated?	Yes ☐ No ☐	0 1

APPENDIX E

FORM 2.4: RESPONDENT'S INFORMATION SHEET AND INFORMED CONSENT FORM

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

1. STUDY TITLE :

Prevalence and factors associated with dehydration among elderly in care homes, Selangor.

2. INTRODUCTION:

I am a final year student of Bachelor Science (Nutrition and Community Health) from Faculty of Medicine and Health Sciences University Putra Malaysia (UPM). Currently, I'm conducting a study about the prevalence and factors associated with dehydration among elderly in care homes, Selangor. ***Nowadays, there are increasing numbers of population of elderly. Most of them are located in care homes which we do not know the health status about dehydration. Thus, the objective of the study is to determine prevalence and factors associated between socio-demographics, body weight status, fluid intake, cognitive status and functional status with dehydration among elderly in care home, Selangor. This study will provide information about factors associated with dehydration and also will give new knowledge to the care homes about the elderly and how to manage and solve the problem.***

You are invited to participate in this study. The details of the research as described in this document. Please take your time to read through and consider this information carefully before you decide if you are willing to participate. Please ask if anything is unclear or if you like more information. If you are happy to participate, you need to sign this informed consent form.

Your participation in this study is voluntary. You may also refuse to answer any questions if you do not want to answer. You may withdraw from this study at any time. If you withdraw, any data collected from you up to your withdrawal will still be used for the study. Your refusal to participate or withdrawal will not affect any medical or health benefits to which you are otherwise entitled.

This study has been approved by the Ethics Committee UPM.

3. WHAT WILL YOU HAVE TO DO?

You need to fill in the questionnaire ***and*** answer all related questions to the study including socio demographic, body weight status, fluid intake, cognitive status and functional status regarding the dehydration. ***The researcher*** will measure your height, weight to determine the nutritional status.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

Individuals who are unable to communicate Malay or English and diagnosed with mental illness or critically ill.

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

You as the subject will find out your constipation status. However, you would not determine overall your health status because this research is only a questionnaire based. Thus, it cannot determine the health status of respondents exactly. The information obtained from this study will determine the prevalence and factors associated with dehydration among elderly at selected care homes in Selangor. Perhaps, this study may **gives awareness for elderly in the care homes about important of having enough fluid intake**

(b) TO THE INVESTIGATOR?

This study will be beneficial to the investigator as it will increase our understanding regarding dehydration. All of this information will be beneficial to **evaluate the prevalence and factor associated with dehydration among elderl in care homes .**

6. WHAT ARE THE POSSIBLE RISKS?

There are no possible physical and psychological risk if you are participating in this study because there are no dangerous techniques or tests involved.

7. WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

All information provided by the participants will be private and confidential. The researcher would not reveal particpants' name or any other private information. This information will not be released to third parties. By signing the consent document for this study, you are giving the permission for the uses and disclosures of your information. The results of this study may be published in a scientific journal. However, you will not be identified by name in any resulting publication or presentation that utilized your information.

8. WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH?

Supervisor Dr. Noraida Binti Omar

03-89472463

noraidaomar@upm.edu.my

dean.medic@upm.edu.my

Investigator Nabil Bin Mazri

013-2102158

nabilmazri96@gmail.com

*Please initial here if you have read and understood the contents of this page*_____

APPENDIX F

UNIVERSITI PUTRA MALAYSIA

FORM 2.5: RESPONDENT'S INFORMATION SHEET AND GUARDIAN'S CONSENT

Please read the following information carefully. Do not hesitate to discuss any questions you may have with the researcher.

1. STUDY TITLE :

Prevalence and factors associated with dehydration among elderly in care homes, Selangor.

2. INTRODUCTION:

I am a final year student of Bachelor Science (Nutrition and Community Health) from Faculty of Medicine and Health Sciences University Putra Malaysia (UPM). Currently, I'm conducting a study about the prevalence and factors associated with dehydration among elderly in care homes, Selangor. You are invited to participate in this study. The details of the research as described in this document. Please take your time to read through and consider this information carefully before you decide if you are willing to participate. Please ask if anything is unclear or if you like more information. If you are happy to participate, you need to sign this informed consent form.

Your participation in this study is voluntary. You may also refuse to answer any questions if you do not want to answer. You may withdraw from this study at any time. If you withdraw, any data collected from you up to your withdrawal will still be used for the study. Your refusal to participate or withdrawal will not affect any medical or health benefits to which you are otherwise entitled.

This study has been approved by the Ethics Committee UPM and Department of Social Welfare, Malaysia

3. WHAT WILL YOU HAVE TO DO?

You need to fill in the questionnaire or answer all related questions to the study including socio demographic, anthropometry data, fluid intake, cognitive status and functional status regarding the dehydration. You will measure your height, weight, calf circumference and mid-upper arm circumference to determine the nutritional status.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

Individuals who are unable to communicate Malay or English and diagnosed with mental illness or critically ill.

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

There may or not be any benefits to you. The information obtained from this study will determine the prevalence and factors associated with dehydration among elderly at

selected care homes in Selangor. Perhaps, this study may improve the health status of elderly in the care homes.

(b) TO THE INVESTIGATOR?

This study will be beneficial to the investigator as it will increase our understanding regarding dehydration. All of this information will be beneficial to evaluate effectiveness of our study.

6. WHAT ARE THE POSSIBLE RISKS?

There are no possible risk if you are participating in this study because there are no dangerous techniques or tests involved.

7. WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

All information provided by the participants will be private and confidential. The researcher would not reveal particpants' name or any other private information. This information will not be released to third parties. By signing the consent document for this study, you are giving the permission for the uses and disclosures of your information. The results of this study may be published in a scientific journal. However, you will not be identified by name in any resulting publication or presentation that utilized your information.

8. WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH?

Supervisor Dr. Noraida Binti Omar

03-89472463

noraidaomar@upm.edu.my

Investigator Nabil Bin Mazri

013-2102158

nabilmazri96@gmail.com

*Please initial here if you have read and understood the contents of this page*_____

APPENDIX G

9. CONSENT

..... Identity Card No. .....

address.....

.....hereby voluntarily agree to take part in the research stated above *(clinical /drug trial/video recording/ focus group/interview-based/ questionnaire-based).

I have been informed about the nature of the research in terms of methodology, possible adverse effects and complications (as written in the Respondent's Information Sheet). I understand that I have the right to withdraw from this research at any time without giving any reason whatsoever. I also understand that this study is confidential and all information provided with regard to my identity will remain private and confidential.

I* wish / do not wish to know the results related to my participation in the research

I agree/do not agree that the images/photos/video recordings/voice recordings related to me be used in any form of publication or presentation (if applicable)

* delete where necessary

Signature .....
(Respondent)

Date :.....

Signature .....
(Witness)

Name :.....

I/C No. :.....

I confirm that I have explained to the respondent the nature and purpose of the above-mentioned research.

Date .....

Signature .....
(Researcher)

APPENDIX H

9. GUARDIAN'S CONSENT

…… Identity Card No. ……
address……
……hereby voluntarily agree to allow my *son / daughter / ward…… to take part in the research stated above *(clinical/ questionnaire/drug trial/video recording/ focus group/interview).

I have been informed about the nature of the research in terms of methodology, possible adverse effects and complications (as written in the Respondent's Information Sheet). I understand that my *son / daughter / ward has the right to withdraw from this research at any time without giving any reason whatsoever. I also understand that this study is confidential and all information provided with regard to the identity of my* son / daughter / ward will remain private and confidential.

I* wish / do not wish to know the results related to my my *son's / daughter's / ward's participation in the research

I agree/do not agree that the images/photos/video recordings/voice recordings related to my son/daughter/ward be used in any form of publication or presentation. (if applicable).

* delete where necessary

Signature ……
(*Parent/Guardian*)

Signature ……
(*Witness*)

Date :……

Name :……

I/C No. :……

I confirm that I have explained to the respondent's parent/guardian the nature and purpose of the above-mentioned research.

Date ……

Signature ……
(*Researcher*)