



UNIVERSITI PUTRA MALAYSIA

***KNOWLEDGE AND PERCEPTION ON ALZHEIMER'S DISEASE
AMONG UNDERGRADUATE STUDENTS IN THE FACULTY OF
MEDICINE AND HEALTH SCIENCES, UNIVERSITI PUTRA MALAYSIA***

GROUP 10

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Abstract

Introduction: In Malaysia it has been estimated that 63,000 persons will have dementia, with an average occurrence of 20,100 individuals in 2005 and will rise to about 126,800 total dementia cases, with 39,000 annual new cases by 2020. The primary underlying cause of dementia is Alzheimer's disease (AD) which is also the most prevalent neurodegenerative disease in Malaysia and worldwide.

Objective: This study aimed to determine the relationship between the sociodemographic factors which were age, gender, ethnicity, family income, year of study, course of study and family members with AD and the level of knowledge and perception on AD among undergraduate students in the FMHS, UPM.

Materials and methods: A cross sectional study was done where the participants for this study were chosen via simple random sampling. The online questionnaire consisted of three sections which were: (1) socio-demographic factors; (2) knowledge on AD; and (3) perception on AD among undergraduate students in the FMHS, UPM. The data was analysed using the Statistical Package for Social Science program (SPSS). Independent T-test and one-way ANOVA test was conducted to identify factors associated with knowledge and perception on AD among respondents.

Results: Majority of the respondents were 19-21 years old, female, Malay, in their first year of study, studying Medicine, in M40 family income status and had no family with AD. The overall mean ADKS was 59.17%. Our result had shown that age, gender, ethnicity and year of study were significantly associated with knowledge of AD. As for the questions to assess the respondents' perception on AD, the most important risk factor chosen by the majority of the respondents to lead to AD was old age. Among all factors, only gender and having family with AD factors did not have any significant association between their groups with their perception towards risk factors causing AD.

Conclusion: The results indicate that there is a significant association between the sociodemographic factors studied with the knowledge and perception on AD among the undergraduate students of FMHS, UPM. Future researchers are suggested to do an extensive study on another medical and health sciences students in other universities and healthcare professionals to increase the awareness on AD and its prevalence.

Keywords: Alzheimer's disease, dementia, knowledge, perception, undergraduate students

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CHAPTER 1

INTRODUCTION

1.1 Background

The nervous system works in many ways to convey messages in the form of electrical signals throughout the body. Nerve impulses are transmitted through nerves from the brain to other body parts and nerve impulse propagates along a neuron via signal transduction.(Holland et al., 2019) Therefore, any damage to the neuron may disrupt the signal transduction pathway of the nervous system. Neuron damage may lead to progressive degeneration of the structure and function of the central nervous system.

Neurodegenerative disease is a worrisome disease rapidly growing in number. Neurodegenerative diseases are characterized by progressive loss due to metabolic or toxic disorders of selectively susceptible populations of neurons, which compares with selected static neuronal loss. The most common disease related to dementia is AD which involves about 60-80% of dementia cases worldwide.(Hussain et al., 2018; Weller & Budson, 2018) AD is the most common cause of dementia by far, accounting for up to 80% of all diagnoses of dementia. AD was later assumed to be an unavoidable result of aging.(Schachter & Davis, 2000) AD is becoming a health burden as there is currently very few reliable effective treatment, due to the progressive aging of the population.(Gitler et al., 2017)

Based on a study conducted in 2016, it is stated that the increasing number of elderly worldwide has caused a rapid rise in neurodegenerative disorders numbers.(Gitler et al., 2017; Heemels, 2016) In 2016, the age-standardized prevalence rate of AD/other dementias and Parkinson's Disease (PD) was calculated to be 759.8 out of 100 000 (95% uncertainty intervals) and 87.1 out of 100 000 (95% uncertainty intervals) individuals, showing a decrease of 0.01% and 42.3% from 1990, respectively in the Eastern Mediterranean Region (EMR). In the older EMR population, neurodegenerative diseases led to 5.4% of the total disability-adjusted life years (DALY) and 4.6% of the total years lost due to disability (YLD) (70 years of age or older in 2016).(Fereshtehnejad et al., 2019) The factors associated with the neurodegenerative disease vary from country to country and are also dependent on socio-demographic factors.(*Alzheimer's Statistics - United States & Worldwide Stats*, 2015; Feigin et al., 2019; Fereshtehnejad et al., 2019; LI et al., 2018)

In Malaysia it has been estimated that 63,000 persons will have dementia, with an average occurrence of 20,100 individuals in 2005. This figure will rise to about 126,800 total dementia cases, with 39,000 annual new cases by 2020. Although dementia is caused by more than 70 types of

neurodegenerative disorders, the primary underlying cause is AD (Catindig et al., 2012) which is the most prevalent neurodegenerative disease in Malaysia.(Akter et al., 2011) However, not many clinical studies and research have been conducted to investigate the prevalence of other forms of neurodegenerative diseases in Malaysia.(Akter et al., 2011)

The knowledge on neurodegenerative diseases, particularly AD, is equally important as understanding this disease can help change the perspective on neurodegenerative diseases and the dangers they hold. 56% of the respondents answered correctly on the assessment for knowledge of AD conducted. (Connell et. al., 2007) Another significant study reported that 49.3% of the respondents which are from caregivers and the general population know the disease's risk factors.(Jorgea et, al., 2018) It was also mentioned that the symptoms and the course of the disease were the most well understood by more than 70% of the respondents from this study.(Jorgea et, al., 2018)

Based on a study among nursing staff in India, they had limited knowledge about AD.(Sharma et al., 2018) In contrast to that, another study demonstrated that the symptoms and course of the disease is best understood among caregivers for AD based on the answers for several questions given.(Al Arifi, 2020)

Therefore, it is important to correlate the knowledge and perception on neurodegenerative disease especially the most prevalent form of neurodegenerative disease, AD, among undergraduate students who will be working in healthcare and health sciences field to standardize their knowledge and understanding on AD in order to provide better healthcare services and to educate non-healthcare workers to seek for medical attention with precipitating signs and symptoms. This study was conducted among the undergraduate students in the FMHS, UPM as there was a variety in socio-demographic factors present that formed a platform to assess the knowledge and perception of students on AD associated with the factors. Moreover, this was assumed to be a beginning to launch an awareness campaign in FMHS, UPM regarding AD and the importance of knowledge on AD.

1.2 Problem Statement

It was found that an estimated 24 million people worldwide suffer from dementia, which is one of the results from AD (Ballard et. al., 2011). AD is a neurological disease which will bring off the loss of neurons mainly in the cortex and hippocampus that leads to a gradual behaviour and cognitive functions impairment such as memory, comprehension, language, attention, reasoning, and judgment (Nussbaum, R. L. & Ellis, C. E., 2003; Kumar, A., Sidhu, J., Goyal, A., 2020). Duthey, B. (2013) writes that people who aged 65 years old and above were the most likely to be diagnosed with this disease.

Based on previous studies, most people nowadays do not have enough knowledge on AD despite how life-threatening the disease is since it can be the serious cause for motility among the elderlies (Alhazzani et al., 2020). This matter happens due to the lack of exposure and awareness of the knowledge of AD to the public. A study stated that there was a knowledge gap among general practitioners and medical professionals in assessing and treating AD. The same article mentioned that the gap was worrying due to the expected increment in the prevalence of AD. They wrote that medical institutions were highly important to decrease the knowledge gap by educating the students since they would also be specialists in their future career (Nagle et al., 2013). In another study which they assessed on demographic and contextual factors related to knowledge about AD, stated that caregivers got a second lower score and undergraduate students had the lowest score among all the groups examined. The same article also mentioned that the evaluation of the gaps between the knowledge of AD among different groups is important to raise awareness of the disease and improve supportive services by holding educational programs (Carpenter et al., 2011).

In this study, we evaluated the knowledge and perception on AD among undergraduate students in the FMHS, UPM. Since most of the Faculty of Medicine and Health Science students learned about the basic medical science, they were most likely to have knowledge about the AD. This knowledge includes symptoms, risk factors, life impact, management, treatment and assessment (Carpenter et al., 2009). However, if the students themselves did not have enough exposure to the disease, it would be difficult to spread the understanding of AD to the others. On the other hand, we wanted to know if the knowledge and perception on AD were affected by some socio-demographic factors which were the age, gender, ethnicity, undergraduate programmes, year of study, family income status and having family members with AD. Therefore, this research was done to determine the knowledge and perception on AD among undergraduate students in the FMHS, UPM.

1.3 Significance of the study

The significance of this study was to provide relevant data about the knowledge and perception on AD among undergraduate students in the FMHS, UPM. From this study, we assessed the knowledge of the students if their knowledge of the disease was adequate and comprehensive and if the level of knowledge was associated and related to the sociodemographic factors. The results and outcome of this study were crucial not just to assess the knowledge and perception among the students, but to provide new information about AD to those who still lacked knowledge. From this, we could create the standardization of the knowledge on AD among the students. Thus, this knowledge can be applied for their studies, work and also to spread awareness about the diseases to others. Moreover, this standardization of knowledge

could help the students who would want to pursue their career in the medical field, in developing the best treatment option for the people who suffer from AD.

1.4 Research Question

The main research questions examined are expressed as follows:

1. Is there any relationship between age with knowledge and perception on AD among undergraduate students in the FMHS, UPM?
2. Is there any relationship between gender with knowledge and perception on AD among undergraduate students in the FMHS, UPM?
3. Is there any relationship between ethnicity with knowledge and perception on AD among undergraduate students in the FMHS, UPM?
4. Is there any relationship between years of study with knowledge and perception on AD among undergraduate students in the FMHS, UPM?
5. Is there any relationship between course of study with knowledge and perception on AD among undergraduate students in the FMHS, UPM?
6. Is there any relationship between family income status with knowledge and perception on AD among undergraduate students in the FMHS, UPM?
7. Is there any relationship between having family members with AD with knowledge and perception on AD among undergraduate students in the FMHS, UPM?
8. What is the knowledge and perception on AD among undergraduate students in the FMHS, UPM?

1.5 Study Objectives

1.5.1 General Objective

To determine the relationship between the socio-demographic factors and the knowledge and perception on AD among undergraduate students in the FMHS, UPM.

1.5.2 Specific Objectives

The specific objective of this study includes:

1. To determine the relationship between age, and knowledge and perception on AD among undergraduate students in the FMHS, UPM.
2. To determine the relationship between gender, and knowledge and perception on AD among undergraduate students in the FMHS, UPM.

3. To determine the relationship between ethnicity, and knowledge and perception on AD among undergraduate students in the FMHS, UPM.
4. To determine the relationship between year of study, and knowledge and perception on AD among undergraduate students in the FMHS, UPM.
5. To determine the relationship between course of study, and knowledge and perception on AD among undergraduate students in the FMHS, UPM.
6. To determine the relationship between family income status, and knowledge and perception on AD among undergraduate students in the FMHS, UPM.
7. To determine the relationship between having family members with AD, and knowledge and perception on AD among undergraduate students in the FMHS, UPM.
8. To determine the knowledge and perception on AD among undergraduate students in the FMHS, UPM.

1.6 Research Hypothesis

1.6.1 Alternative Hypothesis

1. There is a significant association between age, and knowledge and perception on AD among undergraduate students in the FMHS, UPM.
2. There is a significant association between gender, and knowledge and perception on AD among undergraduate students in the FMHS, UPM.
3. There is a significant association between ethnicity, and knowledge and perception on AD among undergraduate students in the FMHS, UPM.
4. There is a significant association between year of study, and knowledge and perception on AD among undergraduate students in the FMHS, UPM.
5. There is a significant association between course of study, and knowledge and perception on AD among undergraduate students in the FMHS, UPM.
6. There is a significant association between family income status, and knowledge and perception on AD among undergraduate students in the FMHS, UPM.
7. There is a significant association between having family members with AD, and knowledge and perception on AD among undergraduate students in the FMHS, UPM.

CHAPTER 2

LITERATURE REVIEW

2.1 Neurodegenerative diseases

2.1.1 Definition of Neurodegenerative Diseases

Neurodegenerative diseases are characterized by progressive loss due to metabolic or toxic disorders of selectively susceptible populations of neurons, which compares with selected static neuronal loss.(Gitler et al., 2017) Neurodegeneration is a characteristic of many crippling, incurable disorders and are rapidly growing in prevalence.(Gitler et al., 2017) For example are AD, Huntington's Disease, PD and multiple sclerosis (MS).(Erkkinen et al., 2018) New and more efficient therapeutic methods need to be developed urgently to tackle these devastating diseases.(Gitler et al., 2017) The prevalence of neurodegenerative diseases is rising due, in part, to lifespan extensions. Sadly, relative to other body functions, regeneration within the nervous system is very slow and there is an increased susceptibility to irreversible cell insults and loss of function of neurons.(Hussain et al., 2018) The vast distribution of neurons throughout the body causes there to be an inadequate waste removal mechanism at the tissue level and the limited proliferation or self-renewal capability of neural cells results in difficulty in regeneration.(Erkkinen et al., 2018; Hussain et al., 2018)

2.2 Alzheimer's Disease

2.2.1 Definition of Alzheimer's Disease

In 1906, Alois Alzheimer, a German neurologist, examined Auguste Deter, a 51-year-old woman who suffered from memory loss, language, disorientation, and hallucinations. In the cerebral cortex, her autopsy showed plaques and tangles which persuaded him that this went beyond ordinary dementia and additional studies that revealed the presence of neuritic amyloid β ($A\beta$) plaques in dementia patients followed his observation.(Tiwari et al., 2019) Hence, it was concluded that AD can be identified by criteria for progressive memory loss, disorientation and pathological markers (senile plaques and neurofibrillary tangles).(Schachter & Davis, 2000)

AD is one of the most debilitating brain diseases of older humans and is an undertreated and under-recognized disorder that is becoming a significant public health concern.(Schachter & Davis, 2000) The most prevalent cause of dementia worldwide is AD, with the prevalence continuing to rise in part due to the aging world population.(Hussain et al., 2018; Weller & Budson, 2018) Aggressive research into, and care of, AD patients has been hindered by the stigma attached to aging and other causes, however these misconceptions are fading away, and therapies are becoming available, albeit initially modest in

efficacy.(Schachter & Davis, 2000) AD was originally thought to be a rare disorder, and it was later assumed to be an unavoidable result of aging.(LI et al., 2018; Schachter & Davis, 2000) In addition to the improved life expectancy of the general population and a greater understanding of the socio-economic effects of the condition, AD is a major public health concern. (Schachter & Davis, 2000)

Alzheimer's disease (AD) is the most common cause of dementia by far, accounting for up to 80% of all diagnoses of dementia - a psychiatric condition characterized by persistent deterioration in two or more areas of cognition, including memory, vocabulary, executive and visuospatial activity, personality, and actions, culminating in loss of ability to perform everyday life's instrumental and/or fundamental activities.(Weller & Budson, 2018)

Growing evidence indicates that genetic, neuronal, and circuit dysregulation are hallmarks for AD. (Heemels, 2016) Neuropsychiatric symptoms (NPSs) are hallmarks of AD. NPSs affect nearly all individuals with dementia, 97 %, and while they fluctuate, they rarely vanish. NPSs are classified based on neurobiological aspects and attitudes, grouping them into five domains: (1) negative valence; (2) positive valence; (3) cognitive mechanisms; (4) social system processes; and (5) excitation or regulatory systems.(Lanctôt et al., 2017) Abnormalities in the areas of memory and expression, visuospatial orientation, and greater executive control are the clinical manifestations of AD, while non-cognitive modifications include changes in personality, diminished capacity for reasoning, wandering, psychosis, disruption of mood, agitation, and abnormalities of sleep.(Schachter & Davis, 2000) In AD delusions, hallucinations, agitation, aggression, depression or dysphoria, anxiety, elation or euphoria, apathy, disinhibition, irritability, motor disorder, sleep disorder, appetite disorder, aberrant vocalization, and ruminative, repetitive, and somatoform habits, dysfunction of cognitive systems may manifest.(Lanctôt et al., 2017)

AD is a neurodegenerative and influential protein-conformational disease (PCD) caused mainly by the abnormal processing and polymerization of normally soluble proteins.(Tiwari et al., 2019) AD is a progressive disease related to the intracellular aggregation of toxic protein aggregates where the amygdala, cortex, and hippocampus display neuronal death.(Hussain et al., 2018) The two hallmark pathologies classically characterize this neurodegenerative disease process are β -amyloid plaque deposition and neurofibrillary tangles of hyperphosphorylated.(Hussain et al., 2018) The predisposition to the PS1 genetic mutation, which is an uncommon, may be the causes for the young onset of the disease.(Tiwari et al., 2019) Extracellular aggregates of A β plaques and intracellular aggregations of neurofibrillary tangles (NFTs), composed of hyperphosphorylated acid-associated microtubules, are recorded histopathological features of AD where the A β plaques originally form in the brain's basal,

temporal, and orbitofrontal neocortex regions and advance across the neocortex, hippocampus, amygdala, diencephalon, and basal ganglia in later stages. A β is present in the mesencephalon, lower brain stem, and cerebellar cortex in critical cases as well. This A β concentration activates the development of the urinary tangle located in the locus coeruleus and the transentorhinal and entorhinal brain regions. (Dugger & Dickson, 2017; Tiwari et al., 2019)

Amyloid pathogenesis begins with altered cleavage by β -secretases (BACE1) and γ -secretases to create insoluble A β fibrils of amyloid precursor protein (APP), an essential protein on the plasma membrane which then oligomerizes, diffuses through synaptic clefts, and interferes with synaptic signalling. As a consequence, it polymerizes into plaque-aggregating insoluble amyloid fibrils and the accumulation of plaques and tangles is accompanied by microglia recruitment which facilitates local inflammatory response and microglial activation, and leads to neurotoxicity.(Tiwari et al., 2019) By inducing inflammation or increasing the production of free radicals, A β seems to be either directly or indirectly harmful to the neuron.(Schachter & Davis, 2000) In another study, it was shown that intra-neuronal amyloid- β (A β) accumulation in neurons increases the susceptibility of oxygen-glucose deficiency to cell death, and interestingly, astrocyte-conditioned culture media exposure of neurons confers safety and these findings highlight major cell non-autonomous interactions between neurons and glia.(Gitler et al., 2017)

The current diagnosis of AD is based mainly on neuropsychological tests and clinical diagnosis of AD involves neuroimaging and tracking of approved biomarkers, such as A β peptide concentrations (A β 1-42:A β 1-40 ratio) as well as complete and hyperphosphorylated CSF proteins (Thr181 and Thr231). Besides, amyloid oligomers and plaque aggregation can also be imaged with positron emission tomography (PET) 18F-florbetapir (or alternatively 11C Pittsburgh compound B), but there is still a nonlinear relation between the A β content in CSF and PET scans.(Tiwari et al., 2019) A test that improves diagnostic accuracy in AD has recently resulted in the development of non-invasive diagnostic imaging in which patients undergo a sophisticated PET scan that detects the deposition of amyloid- β (A β) peptides into plaques in the living brain after injection of a radiolabeled tracer agent and in 2012, clinicians were able to reliably diagnose the disease (later confirmed by autopsy) with up to 96 % sensitivity and 100 % precision using this process.(Weller & Budson, 2018) Indeed, multiple stages of AD have been associated with altered cerebral metabolism (hyper- and hypometabolism).(Tiwari et al., 2019) Another effective, non-invasive technique for detecting functional anomalies is magnetic resonance imaging (MRI) with improved field strength and resolution and to make detection effective iron oxide are used as contrast agents or labelled with fluorescent probes.(Tiwari et al., 2019; Weller & Budson, 2018)

Changes in this vascular system contribute to a decline in global brain perfusion that leads to brain dysfunction and cognitive impairment.(Iadecola, 2013) A history of midlife or late-life prehypertension and hypertension raises the risk of dementia development and promotes AD neuropathology.(Dickstein et al., 2010; Edwards III et al., 2019) Compared to people without diabetes, Type 2 Diabetes Mellitus (T2D) patients are at approximately 60% higher risk for the development of dementia and T2D is proposed to increase the risk of AD and dementia from 1.3 to 5.5 times, and T2D was double the risk of AD and dementia in the Rotterdam study in the 1990s.(Chatterjee et al., 2016; Edwards III et al., 2019) Traumatic brain injury, epilepsy and depression may contribute to progressive brain dysfunction and predispose patients to AD.(Edwards III et al., 2019)

A multi-purpose approach to treating this common form of dementia.(LI et al., 2018) AD may be split into a family type and a sporadic type, as well as an early-onset type (less than 65) and a late-onset type (older than 65). In the general population, the six-month prevalence of AD tends to be 5.5% to 9% and the prevalence of the disease doubles every 10 years with almost half of people 85 years of age and above are affected by AD.(Schachter & Davis, 2000) Age is the best-studied and highest risk factor for dementia among the studied non-modifiable risk factors. Gender (more in females), genetics, for example, having a first-degree parent with a history of dementia and having the apolipoprotein E4 genotype are other non-modifiable risk factors.(Boustani et al., 2003) Dementia has 3 causative gene mutations which are chromosome 21-located β -amyloid protein precursors (A β PP), presenilin 1 (PS1) located on chromosome 14, and presenilin 2 (PS2) located on chromosome 1. 30-70% of mutations are found in PS1, 10-15% in A β PP and 5% in PS2.(Akter et al., 2011)

In emotional and economic terms, treatment and regular care of AD patients are considered expensive. The medications available for the treatment of AD are costly and concentrate only on alleviating symptoms that are inevitably fatal.(Edwards III et al., 2019) Just five prescription therapies for AD have been licensed, despite the essential public health problem it presents, and these act to control symptoms rather than change the course of the disease. Potential disease-modifying therapy trials have usually been performed in patients with clinically observable disease, but evidence indicates that AD-associated pathological changes begin many years earlier and it is conceivable that before the neurodegenerative pathway is identified, pharmacological treatment can be helpful in this preclinical stage.(Briggs et al., 2016) For NPSs in dementia, risperidone is indicated for short-term treatment of chronic violence in moderate-to-severe AD (only in Canada and Europe) while 16 trials are pending, mainly for anger and violence.(Lanctôt et al., 2017)

2.2.2 Prevalence of Alzheimer's Disease

AD is the most common cause of dementia by far, accounting for up to 80% of all diagnoses of dementia.(LI et al., 2018) AD was originally thought to be a rare disorder, and it was later assumed to be an unavoidable result of aging. Aggressive research into, and care of, AD patients has been hindered by the stigma attached to aging and other causes, however these misconceptions are fading away, and therapies are becoming available but are moderately efficacious.(Schachter & Davis, 2000) However, based on another study, AD is becoming a health burden of epidemic proportions, for which there is currently no cure, due to the progressive aging of the population.(Crous-Bou et al., 2017) Disappointing clinical trial outcomes in mild-moderate AD dementia along with strong epidemiological data on risk factors for AD are leading to the growth of primary prevention initiatives. (Crous-Bou et al., 2017)

Globally, AD is the leading cause of dementia (70%) and around 50 million people have dementia (approximately 35 million people suffering from dementia caused by AD), with about 60% living in low- and middle-income countries and there are about 10 million new cases each year.(*Dementia*, 2020) It is estimated that the total number of people with dementia will exceed 82 million in 2030 and 152 million in 2050 and this rise is mostly attributed to the growing numbers of people living in low- and middle-income countries with dementia.(*Dementia*, 2020; Duke et al., 2002) The worldwide prevalence of AD was 26.6 million in 2006 and is said to quadruple by 2050, and 1 in 85 people worldwide will be living with the disease by that point.(Brookmeyer et al., 2007) However, if both disease initiation and development could be postponed by a mere 1 year by treatments, there would be about 9.2 million fewer cases of the disease in 2050, with almost the entire reduction due to declines in people requiring a high level of treatment.(Brookmeyer et al., 2007) Another study stated that about 46.8 million individuals are living with AD and other forms of dementia worldwide with Finland, the United States, Canada, Iceland, Sweden, Switzerland, Norway, Denmark, the Netherlands, and Belgium as the top ten countries most affected by AD followed by India, Cambodia, Georgia and Singapore at lower rates.(*Alzheimer's Statistics - United States & Worldwide Stats*, 2015)

In the USA, millions of Americans have AD-related dementia as the size of the U.S. population of 65 years of age and older is increasing and there will be a spike in AD-related dementia.(*Dementia*, 2020)The number and proportion will both rapidly intensify in years to come, as the population of Americans older than 65 years is projected to expand from 56 million in 2020 to 88 million in 2050. The baby boom generation has turned 74 at the end of 2020 and has a high risk of getting AD-related dementia.(*Dementia*, 2020) It is estimated that 1 out of 10 people aged 65 years old and above in the US have AD. (2020) The number of people with AD-related dementia rises with age: 3% of people aged 65-74, 17% of people aged 75-84, and 32% of people aged 85 and older have Alzheimer's dementia.

People younger than 65 can also experience AD-related dementia, although it is much less common and unknown in prevalence. (*Dementia*, 2020) It is also proven that AD is the 6th most common cause of death in the elderly in the USA. (*Alzheimer's Statistics - United States & Worldwide Stats*, 2015)

A study by H. H Dodge et al. on the dementia prevalence, incidence and mortality suggested that unlike in the USA and some European countries, the incidence of all-cause dementia in Japan is growing. Due to variations in diagnostic criteria, geographic variability, and gender disparity in vascular disease prevalence, it was inconclusive whether the prevalence of AD as compared to Vascular dementia (VaD) was growing or not. (Aggarwal et al., 2012) Another article investigated the prevalence and mortality rates of dementia in elderly people living in Hong Kong. This study indicates that the number of people aged 60 and older in Hong Kong will more than triple within 30 years; hence, the rise in the incidence of dementia cases in this area would be substantial. (Aggarwal et al., 2012)

In contrast to the above articles and studies, another study suggests that Asia's aging population has a growing prevalence of diseases, the most prominent of which is dementia, which presents significant challenges to healthcare systems. Previously, the prevalence of dementia in Asia was found to be lower than in Western populations, with lower prevalence of AD and a higher prevalence of VaD but recent studies indicate a reversal of this ratio, which now resembles that of Western nations. (Catindig et al., 2012) Based on a study to demonstrate the prevalence of AD in China which included 184058 subjects and 7445 patients with AD, the average prevalence of AD was estimated to be 0.04 (95% CI: 0.04–0.05) with higher prevalence in older age groups, among women and in rural areas and has a growing trend in recent years. (LI et al., 2018)

The Malaysian population aged 60 and over has more than doubled from approximately 1 million to 2.2 million between 1991 and 2010, and this is expected to increase to approximately 7 million or 17.6 percent of the projected population of 40 million by 2040. (Tey et al., 2016) The prevalence of dementia in Malaysia in 2020 and 2050 is predicted to be 0.126 percent and 0.454 percent, respectively. (Tey et al., 2016) This is due to the fact that most members of the family view the symptoms of AD as natural aging, and often do not seek medical attention (Alzheimer's Disease International). (Mat Nuri et al., 2017) Moreover, a study carried out in Universiti Sains Malaysia stated that there are scarce epidemiological studies on dementia and elderly people from developed countries, including Malaysia and no reported research in Malaysia was found to report the prevalence of dementia in the elderly using a two-stage technique. The lack of a validated screening method for our Malaysian community is the main issue as to why there are not many studies related to AD and associated dementias. (Norlaily, 2009) The lack of

in-depth studies regarding the prevalence of AD and associated dementia in Malaysia show the need and urgency to conduct more research on this topic.

2.3 Knowledge and Perception on Alzheimer's Disease

2.3.1 Prevalence of the Knowledge and Perception on Alzheimer's Disease

A study conducted on the public's ability to recognize AD and their beliefs about its causes in the city of São Paulo, Brazil. The study showed that 46.4% of the respondents answered that the symptom of the disease is memory loss. In the study, it was also shown that only 4% of the respondents used the term "Alzheimer disease". 39.4% of the respondents understood this disease as a mental illness (Blay & Peluso, 2008). Based on another study, 54% of the respondents answered correctly for their test of knowledge on AD. It was further divided into general and specific knowledge surveys on the disease and found that only 11% of the respondents had specific knowledge on AD and 72% of the respondents had general knowledge on the disease (Steckenrider, J. S., 1993). Other than that, a study mentioned that 56% of the respondents answered correctly on the assessment for knowledge of AD (Connell et. al., 2007). Another study reported that 49.3% of the respondents who are caregivers and the general population are aware of the disease's risk factors. From the same study, it was said that symptoms and course of the disease were the most well understood by more than 70% of the respondents (Jorge et. al., 2018).

A study reported that of the questions for knowledge on AD, 75.5% were answered correctly and the life impact and treatment management were the most understood by the participants. The same study assessed the knowledge based on two groups which are caregivers and non-caregivers. It was shown that caregivers had better knowledge about the disease than non-caregivers (Garcia-Ribas et. al., 2020). Another study has been done in Aseer, Saudi Arabia about public awareness, knowledge, and attitude toward AD. They mentioned that less than 50% of the questions were answered correctly by the respondents (Alhazzani et. al., 2020). There was also a study stating that their respondents, who were nursing students, had some misconceptions about the disease (Sundaran Kada, 2016). On the other hand, a study which involved high school students to assess their stigmatic beliefs on AD led to a result of low levels of stigmatic belief in Alzheimer's patients (Werner, P., et. al., 2017). A study among health university students in Saudi Arabia showed that 70% of the respondents answered the survey correctly and knew that AD has a relation with mental illness (Al Arifi, 2020). A study in Lithuania revealed that 56.1% of the respondents had lack awareness about AD. Other than that, the same study also stated that only 37.9% of the respondents knew that AD can cause death (Jurgilaitė & Beržanskytė, 2020).

2.3.2 Factors associated with knowledge and perception on Alzheimer's disease

2.3.2.1 Age

A study mentioned that 90.7% of the respondents aged 45 years old and above had heard of AD (Steckenrider, J. S., 1993). Another study reported that older caregivers had the least knowledge about AD as they had the worst ADKS score (Jorgea, C., Cetóá, M., & Arias, A., 2018). A study conducted on AD knowledge scale and they found that older adults had better knowledge about the disease than students which were in younger groups (Carpenter et. al., 2009). However, the other study stated that younger respondents in their survey had a better knowledge on AD (Alhazzani et. al., 2020). A survey-based study was done to assess the knowledge of AD among health care staff in Queensland, Australia. In the study, it showed that the respondents below the age of 30 years old had the highest ADKS score which proved they had better knowledge about the disease (Smyth et. al., 2013). The other study also reported that the respondents, specifically public hospitals and health clinics pharmacists, below the age of 30 years old had the highest ADKS score and had the most knowledge among the other respondents that were older (Mat Nuri et. al., 2017). A study mentioned that high school students aged 14-15 years old had a low level of stigmatic beliefs to AD patients (Werner, P., et. al., 2017). A study which involved health university students in Saudi Arabia mentioned that respondents who aged 22-25 years old had the highest ADKS score among the others (Al Arifi, 2020). The importance of this factor is to evaluate if there is any difference in the level of knowledge on AD related to the age of the respondents.

2.3.2.2 Gender and ethnicity

A study to assess the public awareness, knowledge, and attitude towards AD in Aseer region, Saudi Arabia, reported that female respondents scored higher than male respondents that could show females had better knowledge about the disease (Alhazzani et. al., 2020). Another study mentioned that women respondents had higher levels of knowledge on AD than men respondents (Garcia-Ribas et. al., 2020). In a previous study, women participants scored slightly higher ADKS scores than men (Smyth et. al., 2013). A study among Israeli adults stated that female respondents had higher knowledge about AD than male (Werner et. al., 2013). However, in a study conducted among public hospitals and health clinics pharmacists in the state of Selangor stated that male respondents scored higher than females (Mat Nuri et. al., 2017). In addition, another study revealed that female nursing students in the University of Malta had a higher ADKS score than male students (Scerri & Scerri, 2013). The significance of this factor in assessing the knowledge and perception on AD among the population is to evaluate if there is any difference in terms of knowledge on AD based on gender.

In terms of ethnicity relation, it was found that older Caucasians had scored slightly higher on ADKS than older African American (Howell et. al., 2015). In another study which assessed the knowledge among four ethnic groups of older adults, their result revealed that Anglo older adults significantly had higher levels of knowledge about AD than African American, Asian, and Latino older adults (Ayalon & Areán, 2004). Another study involving whites, Hispanics and blacks stated that white participants were the most likely to answer the questions correctly (Connell et. al., 2007). A study conducted among African American and whites and the result showed that African Americans had less awareness about the fact of AD (Roberts, J. S., et. al., 2003). Other than that, a study among pharmacists in the state of Selangor showed that Malay respondents had a higher ADKS score than Chinese, Indian and the other respondents (Mat Nuri et. al., 2017). Another study stated that Israeli Arabs high school students had a higher stigma level to AD patients compared to Jewish students. The same study writes that the level of stigmatic beliefs among the respondents were related to majority-minority status (Werner, P., et. al., 2017). It is crucial to assess the relation between the ethnicity and the knowledge and perception on AD to see if there is any difference related to the ethnicity of the respondents.

2.3.2.3 Course of study and year of study

Undergraduate courses are believed to be the determinant of knowledge of people on AD. In a previous research, final year medical students had a higher percentage of correct ADKS score as compared to final year pharmacy students (Scerri, 2017). In the similar study, Scerri also found that pharmacy students who had exposure to dementia patients during their clinical placements had substantially higher ADKS scores in three domains, which are risk factors understanding, treatment and management and symptoms. This shows that clinical placement may affect the knowledge level of AD. Besides, a study that was completed among health university students in Saudi Arabia showed that medical students had higher levels of knowledge. The reason may be due to in contrast to other courses, medical students had more lectures and long courses (Al Arifi, 2020).

Year of study could be one of the determinants of the level of knowledge of AD too. A large number of second and third-year nursing students who had training in dementia care scored higher mean ADKS scores than first-year nursing students (Scerri, 2013). Also, according to Sharma et al. (2018) and Nagle et al. (2013), the studies showed that final year healthcare students had higher levels of knowledge regarding dementia as compared to first-year healthcare students (cited in Al Arifi, 2020). In a study, a higher percentage of final year medical students was found to learn about dementia in the class as compared to the first year. This study found a strong association between having classes on dementia and knowledge of dementia (Sharma et al., 2018).

2.3.2.4 Family income status

Some website visitors relied on the Internet to get health information such as knowledge regarding dementia and health care professionals and developers of e-Health should expect more elderly caregivers to use the Internet as a valuable medium to gain access to health information(Kernisan, Sudore and Knight, 2010). Therefore, increasing family income status is considered as a factor that will increase the tendency of people to seek health information. After adjusting the confounding effects, a study that discussed factors that affect the online health seeking behaviour of patients revealed that employment status, average monthly income and home computer ownership are major factors impacting patients using the Internet to check for health information. Compared to individuals of the lower social class who are unemployed, earn less income and do not own a computer, this reflects health information seeking activity only in the middle to a higher class of society. While people of lower social status have less access to health care, they appear to have less access to Internet services (Nangsangna & Vroom, 2019).

2.3.2.5 Family members with AD

A study among health care staff reported that the respondents who had a family history of AD got slightly higher ADKS scores than the respondents who did not have any family members with AD. However, the difference in the ADKS score is not significant (Smyth, W., et al., 2013). Another study among family caregivers mentioned in their results that there was a lack of knowledge on AD especially associated with prevalence, causes and symptoms. The same article mentioned that the result of low knowledge on AD was most likely due to low education level and being a spouse (Werner, 2001). There was also a study which reported that family caregivers who had higher levels of education were the most knowledgeable ones among the respondents (Eshbaugh & Stratton, 2016). On the other hand, a study revealed that nursing students who had family members with AD got a higher ADKS score than those who did not have any family members with AD (Scerri & Scerri, 2013).

2.3.3 Way to assess the knowledge and perception on Alzheimer disease

In a previous study, knowledge of AD was assessed by Alzheimer's Disease Knowledge Scale (ADKS) score (Carpenter et. al., 2009). ADKS includes a collection of 30 objects, with choices that are true and false. There are 7 domains in ADKS, which include risk factors, assessment and diagnosis, symptoms, course, life impact, caregiving, and treatment and management.

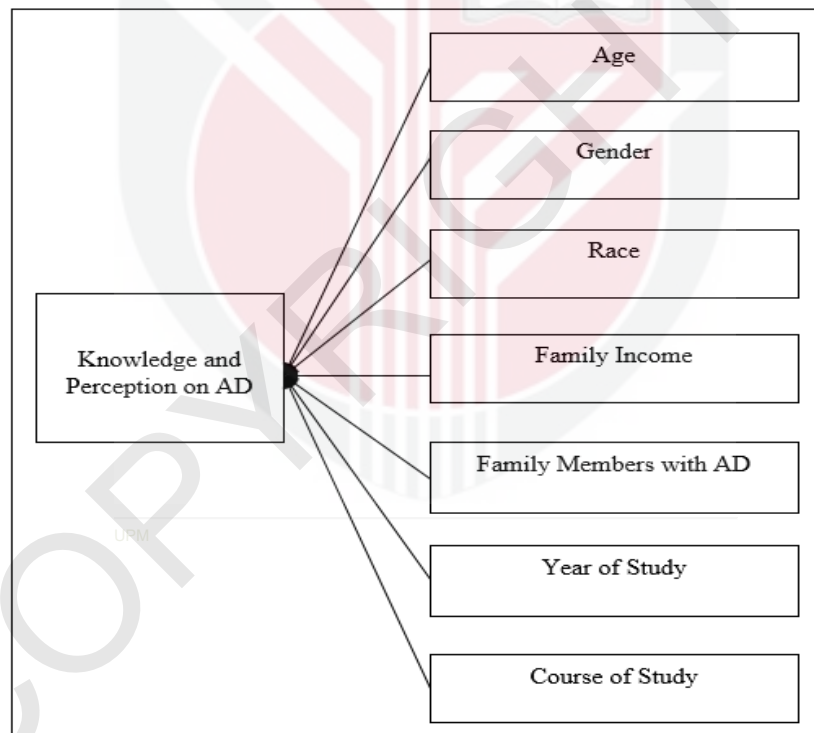
For a study that assessed the public perception of AD, a self-administered questionnaire consisting of 9 items was used (Glover et. al., 2019). The participants in the study were required to choose how important the nine risk factors were to cause the development of AD. The Likert-type scale was used

with endpoints of 1 = “not at all important”, 2 = “somewhat important”, 3 = “very important” and 4 = “extremely important”.

2.4 Selection of population in this study

Students from the Faculty of Medicine and Health Science (FMHS), UPM are a group of people who have fundamental knowledge in the healthcare field. The students of FMHS in UPM need to stay updated with the knowledge on AD as an increasing understanding of AD can aid to recognise the diseases and reduce its stigma. Assessing the level of knowledge and perception on AD among undergraduate students in the FMHS, UPM provided evidence on the necessities of changing study curriculum regarding the part of AD.

2.5 Conceptual framework



In this study, the correlation between the knowledge and perception on AD among undergraduate students in the FMHS, UPM was dependent on seven independent variables which are age, gender, ethnicity, family members with AD, family income, course of study and year of study. To investigate this correlation, a cross-sectional study was done on the FMHS, UPM students.

CHAPTER 3

METHODOLOGY

3.1 Study location

The study took place in the Faculty of Medicine and Health Sciences, University Putra Malaysia.

3.2 Study duration

The study was conducted in two phases. Phase 1 was conducted from 20 December 2020 until 29 January 2021, where proposal writing, proposal presentation and letters preparation for JKEUPM approval were done. Phase 2 was conducted from 1 March 2021 to 5 July 2021, where data collection, data analysis, report writing, final presentation and final report were included.

3.3 Study design

The study design used was a cross-sectional study.

3.4 Sampling

3.4.1 Study population

All undergraduate students in the FMHS, UPM, Serdang Campus. The study population consisted of both males and females.

3.4.2 Sampling frame

A list of undergraduate students who are studying in the FMHS, UPM from Year 1 to Year 5 (if applicable).

3.4.2.1 Inclusion criteria

The respondents must be active undergraduate students in the FMHS, UPM.

3.4.3 Estimated sample size:

Using the formula adopted from Cochran for descriptive cross sectional studies (cited in Nangsangna & Vroom, 2019).

$n = [Z^2 \times P \times (1-P)] / d^2$, where

n = estimated sample size

Z = Standard value for 95% confidence level; 1.96

P = estimated proportion of healthcare students who have sufficient knowledge about Alzheimer's disease; 0.7

d = margin of error; 0.05

The prevalence (p) was taken from a study done in Saudi Arabia (Al Arifi et al., 2020)

$$n = [(1.96^2) \times 0.7 \times 0.3] / (0.05^2)$$

Therefore, $n = 322.69 (\approx 323)$

Taking the 10% of non-responding rate into consideration:

$$323 \times 10\% = 32.3 (\approx 32 \text{ non-responding})$$

Thus, final sample size was $323 + 32 = 355$

3.5 Data Collection

3.5.1 Study Instrument

The study instrument for our research was a questionnaire in Google Form. This Google Form consisted of three sections which are A, B and C. Section A consisted of questions about socio-demographic factors which were the respondents' age, gender, ethnicity, year of study, course of study, family income status and family members with AD. Meanwhile, Section B consisted of questions about the knowledge of the respondents on AD. Section C included the questions to assess the perception of the respondents on AD. The questionnaire was prepared in English. For Section B, it was validated from a study about The Alzheimer's Disease Knowledge Scale (ADKS): Development and Psychometric Properties by Carpenter et. al. (2009). As for the items from Section C, we adapted the items from a study about Perceptions of Risk Factors for Alzheimer's Disease Among Community-Dwelling, Non-Demented Older African Americans by Glover et. al. (2019).

Table 3.1 shows the division of the questionnaire into each section and the explanation.

Section A	Socio-demographic factors	There were a total of 7 questions in this section which include age, gender, ethnicity, year of study, course of study, family income status and family members with AD.
Section B	Knowledge on Alzheimer's disease	• There were a set of 30 questions to assess the knowledge of respondents on AD. • The answer choices were "True" and

		“False”.
Section C	Perception of Alzheimer’s disease	• We assessed the perception of the respondents on AD using their understanding of risk factors of AD. • There were 9 risk factors and the respondents were asked whether the risk factors listed are important ones or not. • We prepared four choices of answers which were “not important at all”, “somewhat important”, “very important” and “extremely important”.

3.5.2 Validity and Variability

We have included questionnaires that we have adapted from previous studies. For Section B, it was validated from a study about The Alzheimer's Disease Knowledge Scale: Development and Psychometric Properties by Carpenter et. al. (2009). As for the items from Section C, we adapted the items from a study about Perceptions of Risk Factors for Alzheimer’s Disease Among Community-Dwelling, Non-Demented Older African Americans by Glover et. al. (2019).

A pre-testing on the questionnaire was carried out to assess the reliability of the questionnaire and was randomly distributed to 50 undergraduate students in FMHS, UPM. The questionnaire was modified based on the feedback from the supervisor, co-supervisor and 50 undergraduate students to ensure the collected data was consistent and relevant. The Cronbach’s alpha values were obtained for each set of the

questions. The Cronbach's alpha value obtained for our research was 0.792 for Section B and 0.751 for Section C. Cronbach's alpha value should be more than 0.7 to be accepted.

3.5.3 Data Collection Technique

Simple random sampling method was applied. Data was collected by distributing the self-administered questionnaire. The questionnaire was distributed via various online platforms such as Whatsapp, Messenger, Google Mail and Telegram to targeted respondents which were undergraduate FMHS students in UPM. We shared the questionnaire using the Google Form link. The response was limited to one response per email. The respondents were required to answer all the questions and the data they submitted was automatically recorded in the google form. The link for the google form is <https://forms.gle/ipjMX4RMqGV87TQe7>.

3.6 Data Analysis

After obtaining data, a normality test was conducted by IBM Statistical Package for the Social Science (SPSS) based on Kolmogorov-Smirnov method. If the data has a p-value > 0.05 , the data will be considered as normally distributed. The socio-demographic factors were analysed by descriptive statistics using frequency and percentage. T-tests and one-way ANOVA tests were used to analyse the association between the independent variables which were the socio-demographic factors and dependent variables which were the knowledge and perception on AD among undergraduate students in the FMHS, UPM. The level of significance was set at $p < 0.05$.

3.7 Variables

3.7.1 Dependent Variable

The dependent variables were the knowledge and perception on AD among undergraduate students in the FMHS, UPM.

3.7.2 Independent Variable

The independent variables were the socio-demographic factors (age, gender, ethnicity, family income, course of study, year of study and family members with AD).

3.8 Expected Outcome

The sociodemographic factors and knowledge and perception on AD among undergraduate students in the FMHS, UPM was investigated and was expected to give a clear overview that the understanding of AD among students was influenced by the independent factors. The respondents were expected to have good or average knowledge on AD since the factor of year and program of study was believed to play an important role in influencing the respondents' knowledge on AD. As for the

perception, the outcome varied depending on all the other socio-demographic factors that were investigated.

3.9 Operational Definition

Term	Definition
Age	It was determined by the respondent's date of birth.
Gender	It was defined as being born as a male or a female.
Ethnicity	It was defined by being a Malay, Chinese, Indian or Others, This was self-reported by the respondents.
Family income	Respondent's familial economic status or money received regularly for work or through investments made by them.
Knowledge	The knowledge score was assessed based on the previously published study about The Alzheimer's Disease Knowledge Scale: Development and Psychometric Properties by Carpenter, B. D., Balsis, S., Otilingam, P. G., et. al. (2009) and the study about Perceptions of Risk Factors for Alzheimer's Disease Among Community-Dwelling, Non-Demented Older African Americans by Glover, C. M., CoCroft, S., James, B. D., et. al. (2019)
Neurodegenerative disease	It was defined by the respondent's answers to questions in the questionnaire regarding neurodegenerative disease
Perception	It was defined by the respondent's answers to questions in the questionnaire regarding perception on the neurodegenerative disease and AD
Program of study	It was determined by the respondent's course of study (dietetics, nutrition and health science, biomedical, medicine, environmental health, nursing)
Alzheimer's disease	It was defined by the respondent's answers to questions in the questionnaire regarding AD
Family members with	It was defined by the respondent's answer to the question regarding having

AD	(had) family members AD
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3.10 Study Ethics

The ethical clearance from the Ethical Committee for Study Involving Human Subjects of Universiti Putra Malaysia (JKEUPM) was obtained with a reference number JKEUPM-2021-100. The participants' consent was obtained via the Google Form in Section A before they proceeded with answering the questions. They gave consent by agreeing or disagreeing to participate in the questionnaire.

3.11 Limitations

The study only focused on undergraduate students of FMHS, UPM hence the result of this study was limited to the undergraduate students of FMHS, UPM only since the variables used in this study were more applicable and suitable to be studied in the age group of younger and developing adults (19 to 25 years old). Besides, the casual relationship could not be determined through this study as it is a cross-sectional study. Moreover, the study was limited to UPM only as this allowed the population size to be controlled easily and it was easier to collect data for this research since this was the institution of choice.

CHAPTER 4

RESULT

4.1 Response Rate

Among the 355 targeted respondents, only 290 were able to participate in this study. The response rate was calculated using the formula below:

$$\text{Response rate} = \frac{\text{Consented}}{\text{Eligible}} \times 100\%$$

$$\text{Response rate} = \frac{290}{355} \times 100\%$$

$$\text{Response rate} = 81.69\%$$

4.2 Normality test

Two numerical datas were collected in our study which were age and knowledge on AD. The variables were checked for normality using histogram, Kolmogorov-Smirnov and Shapiro-Wilk tests.

The minimum age of our respondents was 19 years while the maximum age of our respondents was 25 years. The Histogram was skewed to the right. Kolmogorov-Smirnov and Shapiro-Wilk tests showed $p\text{-value} < 0.05$ ($p=0.001$). All tests indicated that the age of respondents was not normally distributed with a mean of 1.26 and standard deviation of 0.539.

However, based on the Central Limit Theorem, it is stated that a sufficiently large number sample size of 30 or more, the assumption that the distribution of the sample means will be approximately normally distributed can be made.(Kwak & Kim, 2017)

Histogram 4.2.1: The categories of ages of the respondents

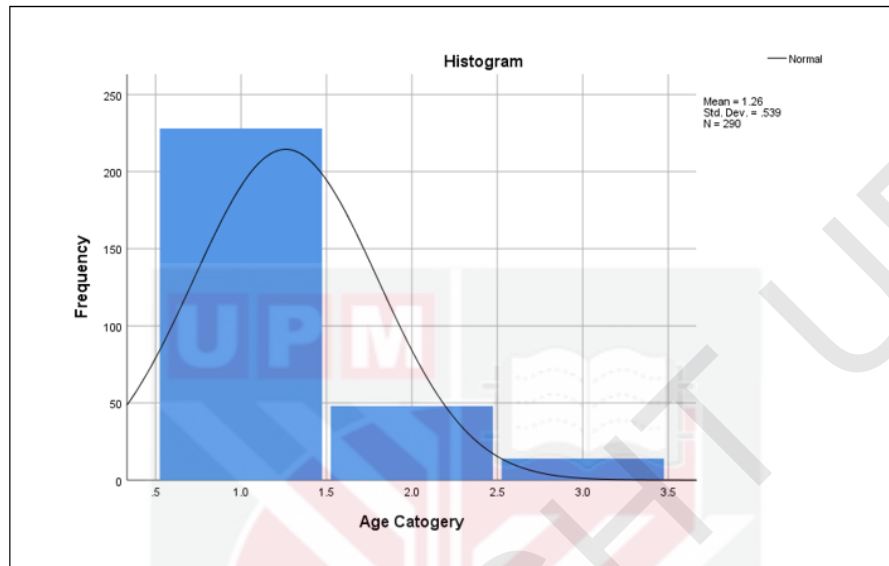


Table 4.2.1: Kolmogorov-Smirnov and Shapiro-Wilk tests for the categories of ages of respondents

Test of Normality						
Kolmogorov-Smirnov				Shapiro-Wilk		
Age Category	0.473	290	0.000	0.529	290	0.000

Table 4.2.2: The mean and standard deviation of the categories of the ages of respondents

		Statistic	Std. Error
Age Catogery	Mean	1.26	.032
	95% Confidence Interval for Mean	Lower Bound	1.20
		Upper Bound	1.32
	5% Trimmed Mean	1.18	
	Median	1.00	
	Variance	.291	
	Std. Deviation	.539	
	Minimum	1	
	Maximum	3	
	Range	2	
	Interquartile Range	0	
	Skewness	1.969	.143
	Kurtosis	2.938	.285

AD knowledge score among undergraduate students of FMHS, UPM had a minimum score of 0% and maximum score of 100%. The histogram showed a bell shaped AD knowledge score (ADKS) distribution. Kormogorov-Smirnov and Shapiro-Wilk tests showed a p-value < 0.05 ($p=0.001$). All tests showed that the AD knowledge score among undergraduate students of FMHS, UPM was normally distributed. The mean was 59.168 and standard deviation was 10.104.

Histogram 4.2.2: The AD knowledge scores of respondents

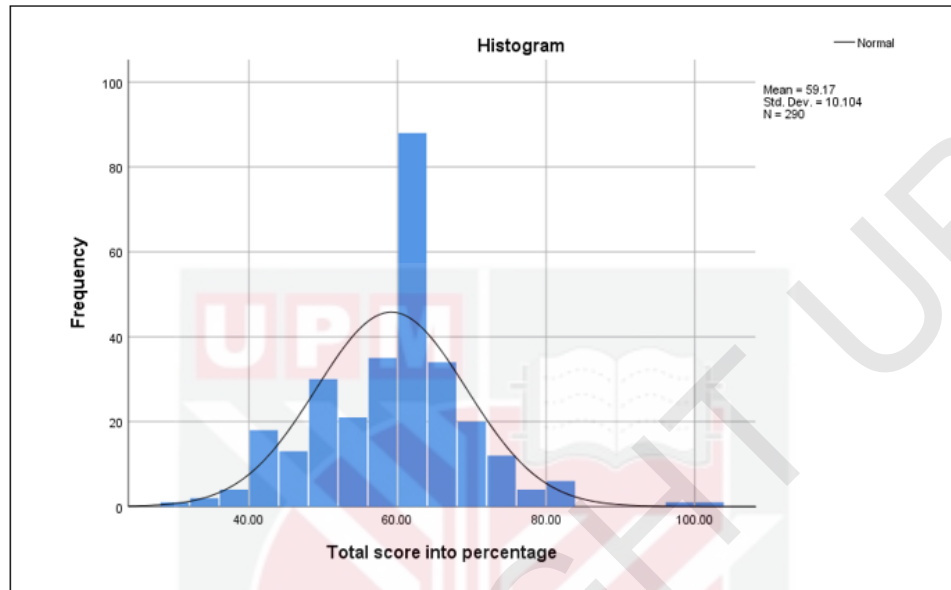


Table 4.2.3: Kolmogorov-Smirnov and Shapiro-Wilk tests for the AD knowledge scores of respondents

Test of Normality						
Kolmogorov-Smirnov				Shapiro-Wilk		
Age Category	0.105	290	0.000	0.977	290	0.000

Table 4.2.4: The mean and standard deviation of the AD knowledge scores of respondents

			Statistic	Std. Error
Total score into percentage	Mean		59.1679	.59335
	95% Confidence Interval for Mean	Lower Bound	58.0000	
		Upper Bound	60.3357	
	5% Trimmed Mean		59.1712	
	Median		60.0000	
	Variance		102.099	
	Std. Deviation		10.10439	
	Minimum		30.00	
	Maximum		100.00	
	Range		70.00	
	Interquartile Range		13.34	
	Skewness		.093	.143
	Kurtosis		1.079	.285

4.3 Descriptive Statistics

4.3.1 Sociodemographic characteristics

Table 4.3.1 shows the frequency distribution of a total 290 respondents based on their demographic characteristics. The majority of the respondents were 19 to 21 years old, females, Malays, in their first year of studies, studying Doctor of Medicine, came from M40 (respondents with a monthly family income of RM 4,850-RM 10,959) family income status, and did not have any family members with AD.

Table 4.3.1 Frequency of each sociodemographic factors

Variables	Frequency (N=290)	Percentage (%)
Age		
19-21	228	78.6
22-23	48	16.6
24-25	14	4.8

Gender		
Female	208	71.7
Male	82	28.3
Ethnicity		
Malay	159	54.8
Chinese	79	27.2
Indian	47	16.2
Others	5	1.7
Year of study		
Year 1	118	40.7
Year 2	112	38.6
Year 3	31	10.7
Year 4	18	6.2
Year 5	11	3.8
Course of study		
Doctor of Medicine	222	76.6
Science Environmental and Occupational Health	7	2.4
Science Dietetic	15	5.2
Science Nutrition and Community Health	20	6.9
Biomedical Sciences	12	4.1
Nursing	14	4.8
Family income status		
B40	102	35.2
M40	119	41.0
T20	69	23.8
Family with AD		
Yes, I have	11	3.8
No	279	96.2

4.3.2 Knowledge on AD

Table 4.3.2 reveals the answers from respondents for knowledge of Alzheimer's disease. Their knowledge was assessed by Alzheimer's Disease Knowledge Scale (ADKS). The overall mean ADKS of respondents was 59.17%. Out of 290 respondents, 252 respondents (86.90%) answered at least 15 questions correctly.

Table 4.3.2 Frequency of answer from respondents for knowledge of Alzheimer's disease

Questions	True	False
People with Alzheimer's disease are particularly prone to depression.	231	59
It is safe for people with Alzheimer's disease to drive, as long as they have a companion in the car at all times.	136	154
Tremor or shaking of the hands or arms is a common symptom in people with Alzheimer's disease.	212	78
Alzheimer's disease cannot be cured.	240	50
If trouble with memory and confused thinking appears suddenly, it is likely due to Alzheimer's disease.	193	97
Alzheimer's disease can cause dementia.	270	20
Trouble handling money or paying bills is a common early symptoms of Alzheimer's disease.	211	79
Poor nutrition can make the symptoms of Alzheimer's disease worse.	233	57
Eventually, a person with Alzheimer's disease will need 24-hour supervision.	236	54
In rare cases, people have recovered from Alzheimer's disease.	191	99
It has been scientifically proven that mental exercise can prevent a person from getting Alzheimer's disease.	251	39
After symptoms of Alzheimer's disease appear, the average life expectancy is 6 to 12 years.	171	119
When a person with Alzheimer's disease becomes agitated, a medical examination might reveal other health problems that caused the agitation.	240	50

People with Alzheimer's disease do best with simple, instructions given one step at a time.	257	33
When people with Alzheimer's disease begin to have difficulty taking care of themselves, caregivers should take over right away.	231	59
If a person with Alzheimer's disease becomes alert and agitated at night, a good strategy is to try to make sure that the person gets plenty of physical activity during the day.	227	63
People whose Alzheimer's disease is not yet severe can benefit from psychotherapy for depression and anxiety.	252	38
Most people with Alzheimer's disease live in nursing homes.	186	104
People in their 30s can have Alzheimer's disease.	192	98
A person with Alzheimer's disease becomes increasingly likely to fall down as the disease gets worse.	236	64
When people with Alzheimer's disease repeat themselves, it is helpful to remind them.	241	49
Once people have Alzheimer's disease, they are no longer capable of making informed decisions about their own care.	196	94
Having high cholesterol may increase a person's risk of developing Alzheimer's disease.	152	138
Symptoms of severe depression can be mistaken for symptoms of Alzheimer's disease.	233	57
One symptom that can occur with Alzheimer's disease is believing that other people are stealing one's things.	185	105
When a person has Alzheimer's disease, using reminder notes is a crutch that can contribute to decline.	211	79
Prescription drugs that prevent Alzheimer's disease are available.	153	137
Having high blood pressure may increase a person's risk of developing Alzheimer's disease.	186	104
Genes can only partially account for the development of Alzheimer's disease.	239	51
Most people with Alzheimer's disease remember recent events better than things that happened in the past.	153	137

4.3.3 Perception on AD

Table 4.3.3 shows the mean scale of each of the items in the questionnaire for perception on AD. The questionnaire had a Likert-type scale range from 1 to 4 which were “not important at all”, “somewhat important”, “very important” and “extremely important”. As could be seen, the item which was considered the most important risk factor that can lead to AD from the respondents’ perception was old age with a mean scale of 3.70. On the other hand, the risk factor that was considered as the least important factor that led to AD was heavy smoker. The perception of the respondents on AD was generally well because the mean scale for all the items did not vary significantly from each other.

Table 4.3.3 Mean scale of each items in the questionnaire of perception on Alzheimer’s disease

Variables	Mean Scale
Genetics	3.53
Mental illness	3.06
Stress	3.09
God’s will	2.74
Head injury	3.05
Exposure to toxin	2.92
Heavy alcohol intake	2.89
Old age	3.70
Heavy smoker	2.71

Table 4.3.3 shows the frequency of answers from the respondents for each item in the perception on AD section. Majority of the respondents believed that genetics, God’s will, head injury and old age were extremely important risk factors that contributed to AD. The other items which were mental illness, stress, exposure to toxin, heavy alcohol intake and heavy smoker were chosen as the very important risk factors leading to AD. Out of all these items, the risk factor of old age shows the most significant difference between the ones who answered it as an extremely important factor and the others who indicated that this risk factor was not the most important risk factor.

Table 4.3.4 Frequency and percentage of answer from respondent for perception on AD according to the scale 1 to 4

Variables (Which of the following factors contribute to AD?)	Likert scale	Frequency (N=290)	Percentage (%)
Genetics	1: Not important at all	4	1.4
	2: Somewhat important	23	7.9
	3: Very important	78	26.9
	4: Extremely important	185	63.8
Mental illness	1: Not important at all	14	4.8
	2: Somewhat important	59	20.3
	3: Very important	114	39.3
	4: Extremely important	103	35.5
Stress	1: Not important at all	11	3.8
	2: Somewhat important	48	16.6
	3: Very important	136	46.9
	4: Extremely important	95	32.8
God's will	1: Not important at all	71	24.5
	2: Somewhat important	53	18.3
	3: Very important	47	16.2
	4: Extremely important	119	41.0
Head injury	1: Not important at all	15	5.2
	2: Somewhat important	65	22.4
	3: Very important	101	34.8
	4: Extremely important	109	37.6
Exposure to toxin	1: Not important at all	17	5.9
	2: Somewhat important	78	26.9

	3: Very important	105	36.2
	4: Extremely important	90	31.0
Heavy alcohol intake	1: Not important at all	16	5.5
	2: Somewhat important	86	29.7
	3: Very important	103	35.5
	4: Extremely important	85	29.3
Old age	1: Not important at all	3	1.0
	2: Somewhat important	10	3.4
	3: Very important	58	20.0
	4: Extremely important	219	75.5
Heavy smoker	1: Not important at all	31	10.7
	2: Somewhat important	87	30.0
	3: Very important	106	36.6
	4: Extremely important	66	22.8

4.4 Analytic Statistics

4.4.1 Association between sociodemographic factors with the knowledge of AD

Table 4.4.1 shows the association between each sociodemographic factor with the knowledge of AD. We analysed the data by using One Way ANOVA and independent T-tests.

As for age, the p-value for ANOVA was less than 0.05 ($p=0.023$), therefore it was statistically significant between the age and knowledge of AD. Those aged 24-25 years old had the highest mean ADKS of 65.71. Those aged 19-21 years old had the lowest mean ADKS of 58.52. The mean ADKS for those aged 19-21 years old was 58.52. Lastly, those aged 22-23 years old had the mean ADKS of 60.35. Post Hoc Test showed that there was a significant difference between mean ADKS of those aged 19-21 years old and those aged 24-25 years old ($p=0.009$).

As for gender, the p-value was less than 0.05 ($p=0.034$), therefore there was a significant association between gender and knowledge of AD. The mean ADKS of females was 59.96 while the mean ADKS of male was 57.17.

Our results had shown that the p-value for ANOVA test for ethnicity was less than 0.05($p=0.029$), therefore it was statistically significant. The mean ADKS for Malay was 57.81 and for Chinese was 61.22. The mean ADKS for Indian was 59.50 and for others was 66.67. Post Hoc Test showed that there was significant difference between mean ADKS of Malay and Chinese ($p=0.014$)

As for year of study, the p-value for ANOVA test was less than 0.05($p=0.033$), showing that there was a significant association between year of study and knowledge of AD. Year 5 students had the highest mean ADKS, which was 66.06. Post hoc test showed that there was a significant difference between the mean ADKS score of Year 1 and Year 5 students ($p=0.007$) and between Year 2 and Year 5 students ($p=0.038$).

As for family income status, our results showed that the p-value was more than 0.05($p=0.948$), therefore there was no significant association between the family income status and knowledge of AD. Students that came from B40 (students with family income lower than RM 4,850 monthly) had the highest mean ADKS of 58.95.

As for course of study, the p-value for the ANOVA test was more than 0.05($p=0.888$), hence there was no significant association between the course of study and knowledge of AD. Students of Biomedical Science from FMHS had the lowest mean ADKS of 58.06 while students of Nutrition and Community Health from FMHS had the highest mean ADKS of 61.17.

As for family members with AD, the p-value of ANOVA test had more than 0.05 ($p=0.781$), therefore there was no significant association between having family members with AD and knowledge of AD. Students who had family members with AD had the mean ADKS of 60 while students with family members without AD had the mean ADKS of 59.14.

Table 4.4.1 Association between sociodemographic factors with the knowledge of AD

Associated factors	Mean ADKS score	Total	T-test		
			T value	df	p-value
Gender					
Female	59.96	208	2.130	288	0.034

Male	57.17	82			
Family members with AD					
Yes	60.00	11	0.278	288	0.781
No	59.14	279			

Associated factors	Mean ADKS score	Total	ANOVA		
			F value	df	p-value
Age					
19-21	58.52	228	3.810	2	0.023
22-23	60.35	48			
24-25	65.71	14			
Ethnicity					
Malay	57.81	159	3.044	3	0.029
Chinese	61.22	79			
Indian	59.50	47			
Others	66.67	5			
Course of study					
Doctor of Medicine	58.88	222	0.340	5	0.888
Biomedical Science	58.06	12			
Environmental and Occupational Health	58.57	7			
Dietetic	60.89	15			
Nutrition and Community Health	61.17	20			
Nursing	60.24	14			

Year of Study					
1	57.45	118	2.663	4	0.033
2	59.46	112			
3	61.08	31			
4	61.11	18			
5	66.06	11			
Income status					
B40	58.95	102	0.053	2	0.948
M40	59.39	119			
T20	59.10	69			

***post hoc test, significant at $p < 0.05$**

Table 4.4.2 Post Hoc test to determine Mean difference Between Each Age Group

Age group		Mean difference	p-value
19-21	22-23	-1.830	0.250
	24-25	-7.197	0.009
22-23	12-21	1.830	0.250
	24-25	-5.366	0.079
24-25	19-21	7.197	0.009
	22-23	5.366	0.079

****significant at $p < 0.05$**

Table 4.4.3 Post Hoc test to determine Mean difference Between Each Ethnicity

Ethnicity		Mean difference	p-value
Malay	Chinese	-3.412	0.014
	Indian	-1.692	0.309
	Others	-8.856	0.052
Chinese	Malay	3.412	0.014
	Indian	1.720	0.351
	Others	-5.444	0.239

Indian	Malay	1.692	0.309
	Chinese	-1.720	0.351
	Others	-7.164	0.129
Others	Malay	8.856	0.052
	Chinese	5.444	0.239
	Indian	7.164	0.129

****significant at $p < 0.05$**

Table 4.4.4 Post Hoc test to determine Mean difference Between Each Year of Study

Year of study		Mean difference	p-value
Year 1	Year 2	-2.018	0.127
	Year 3	-3.630	0.073
	Year 4	-3.665	0.128
	Year 5	-8.614	0.007
Year 2	Year 1	2.018	0.127
	Year 3	-1.612	0.427
	Year 4	-1.647	0.517
	Year 5	-6.596	0.038
Year 3	Year 1	3.630	0.073
	Year 2	1.613	0.427
	Year 4	-0.035	0.991
	Year 5	-4.984	0.156
Year 4	Year 1	3.665	0.148
	Year 2	1.647	0.517
	Year 3	0.035	0.991
	Year 5	-4.949	0.197
Year 5	Year 1	8.614	0.007
	Year 2	6.596	0.038
	Year 3	4.984	0.156
	Year 4	4.949	0.197

****significant at $p < 0.05$**

4.4.2 Association between sociodemographic factors and perception on Alzheimer's disease

Table 4.4.5 shows the association between age and perception on AD. Out of 9 items in the questionnaire, only two items had significant p-values (< 0.05) which were God's will and old age. The age groups did not differ significantly on the following risk factors which were genetics, mental illness, stress, head injury, exposure to toxin, heavy alcohol intake and heavy smoker. However, the respondents in different groups of age had a significant association with their perception on risk factors, God's will

and old age. The respondents in the category of 19 to 21 years old chose God's will and old age as the important factors contributing to AD compared to those in the age group of 22-23 and 24-25 years old.

Table 4.4.5 Association between age and perception on AD

Variables	19-21 years old	22-23 years old	24-25 years old	p-value
Genetics	3.54	3.52	3.43	0.844 (NS)
Mental illness	3.04	3.23	2.71	0.124 (NS)
Stress	3.09	3.17	2.71	0.172 (NS)
God's will	2.96	2.00	1.57	0.000 (S)
Head injury	3.11	2.81	2.93	0.107 (NS)
Exposure to toxin	2.97	2.69	3.00	0.136 (NS)
Heavy alcohol intake	2.95	2.65	2.64	0.057 (NS)
Old age	3.73	3.67	3.29	0.019 (S)
Heavy smoker	2.75	2.58	2.57	0.451 (NS)

***NS: Not Significant**

***S: Significant**

Table 4.4.6 shows the association between gender and perception on AD. However, every item in the questionnaire did not have a significant difference between the female and male respondents (p-value > 0.05) on their perception for the risk factors of AD.

Table 4.4.6 Association between gender and perception on AD

Variables	Female	Male	p-value
Genetics	3.54	3.50	0.637 (NS)
Mental illness	3.05	3.06	0.943 (NS)
Stress	3.08	3.10	0.880 (NS)
God's will	2.82	2.52	0.063 (NS)
Head injury	3.08	2.96	0.313 (NS)
Exposure to toxin	2.94	2.89	0.688 (NS)
Heavy alcohol intake	2.88	2.90	0.847 (NS)
Old age	3.71	3.68	0.756 (NS)
Heavy smoker	2.72	2.70	0.832 (NS)

***NS: Not Significant**

***S: Significant**

Table 4.4.7 shows the association between ethnicity and perception on AD. The respondents with different ethnicity did not show any significant difference for their perception on risk factors contributing to AD except for mental illness and God's will. Indian respondents believed that mental illness was an important factor for AD compared to the other ethnicity. On the other hand, Malay respondents chose God's will as an important factor leading to AD than the other ethnicity.

Table 4.4.7 Association between ethnicity and perception on AD

Variables	Malay	Chinese	Indian	Others	p-value
Genetics	3.54	3.57	3.45	3.40	0.774 (NS)
Mental illness	2.86	3.29	3.32	3.00	0.000 (S)
Stress	2.99	3.14	3.34	3.00	0.055 (NS)
God's will	3.31	1.99	2.23	1.20	0.000 (S)
Head injury	3.16	2.92	2.89	2.80	0.116 (NS)
Exposure to toxin	2.89	2.91	3.09	2.60	0.504 (NS)
Heavy alcohol intake	2.91	2.85	2.94	2.20	0.340 (NS)
Old age	3.67	3.75	3.72	3.80	0.744 (NS)
Heavy smoker	2.70	2.66	2.85	2.60	0.713 (NS)

***NS: Not Significant**

***S: Significant**

Table 4.4.8 shows the association between year of study and perception on AD. The respondents in different years of study did not show any significant difference on the perception of risk factors genetics, mental illness, stress, head injury, and exposure to toxins. Meanwhile, for risk factors such as God's will, heavy alcohol intake, old age and heavy smoker, there was a significant difference between these groups. Respondents in their second year of study chose heavy alcohol intake, old age and heavy

smoker as the important risk factors for AD than the other respondents in different years of study. On the other hand, respondents in their first year of study were more likely to find God's will as an important risk factor contributing to AD.

Table 4.4.8 Association between year of study and perception on AD

Variables	Year 1	Year 2	Year 3	Year 4	Year 5	p-value
Genetics	3.58	3.50	3.52	3.44	3.45	0.858 (NS)
Mental illness	3.03	3.05	3.13	3.33	2.64	0.319 (NS)
Stress	3.03	3.17	3.03	3.22	2.82	0.436 (NS)
God's will	2.97	2.92	1.94	2.11	1.64	0.000 (S)
Head injury	3.03	3.18	2.68	3.06	2.91	0.093 (NS)
Exposure to toxin	2.89	3.04	2.52	3.06	3.00	0.060 (NS)
Heavy alcohol intake	2.79	3.12	2.61	2.61	2.82	0.008 (S)
Old age	3.68	3.80	3.65	3.56	3.27	0.026 (S)
Heavy smoker	2.58	2.93	2.48	2.67	2.64	0.037 (S)

***NS: Not Significant**

***S: Significant**

Table 4.4.9 shows the association between course of study and perception on AD. Despite having different courses of study, they did not have any significant difference on the perception of the risk factors causing AD except for heavy smokers. The respondents who were studying Bachelor of Science in Environmental and Occupational Health indicated that being a heavy smoker was an important risk factor leading to AD in contrast to the other respondents in different undergraduate programs.

Table 4.4.9 Association between course of study and perception on AD

Variables	Doctor of Medicine	Science Environmental and Occupational Health	Science Dietetic	Science Nutrition and Community Health	Biomedical Sciences	Nursing	p-value
Genetics	3.55	3.86	3.67	3.55	3.42	3.07	0.129 (NS)
Mental illness	3.08	2.86	3.07	3.15	2.83	2.86	0.815 (NS)
Stress	3.09	3.14	3.13	3.20	3.00	2.93	0.948 (NS)
God's will	2.73	3.86	2.73	2.35	2.42	3.14	0.069 (NS)
Head injury	3.04	3.57	3.33	2.85	2.67	3.29	0.153 (NS)
Exposure to toxin	2.92	3.29	3.13	2.85	2.75	2.86	0.763 (NS)
Heavy alcohol intake	2.92	3.00	2.80	2.90	2.33	2.86	0.399 (NS)

Old age	3.73	3.71	3.60	3.60	3.75	3.50	0.678 (NS)
Heavy smoker	2.78	3.00	2.33	2.80	2.00	2.43	0.025 (S)

***NS: Not Significant**

***S: Significant**



Table 4.4.10 shows the association between family income status and perception on AD. The respondents did not differ significantly for their perception on risk factors of AD which were genetics, stress, head injury, exposure to toxin, heavy alcohol intake, old age and heavy smoker. The respondents who were in B40 family income status picked mental illness and God's will as the risk factors which were important to contribute to AD compared to the other respondents in different family income status groups.

Table 4.4.10 Association between family income status and perception on AD

Variables	B40	M40	T20	p-value
Genetics	3.56	3.50	3.54	0.845 (NS)
Mental illness	3.24	3.01	2.87	0.019 (S)
Stress	3.14	3.06	3.06	0.727 (NS)
God's will	2.91	2.51	2.87	0.032 (S)
Head injury	3.20	2.97	2.96	0.118 (NS)
Exposure to toxin	3.04	2.89	2.81	0.234 (NS)
Heavy alcohol intake	3.01	2.80	2.86	0.204 (NS)
Old age	3.67	3.73	3.70	0.716 (NS)
Heavy smoker	2.77	2.66	2.72	0.639 (NS)

***NS: Not Significant**

***S: Significant**

Table 4.4.11 shows the association between having family members with AD and perception on AD. Even though some of the respondents had family members with AD, there still was no significant difference between these two groups on their perception of risk factors that can cause AD.

Table 4.4.11 Association between having family members with AD and perception on AD

Variables	Yes, I have	No	p-value
Genetics	3.36	3.54	0.421 (NS)
Mental illness	3.09	3.05	0.889 (NS)
Stress	2.91	3.09	0.455 (NS)
God's will	2.45	2.75	0.436 (NS)
Head injury	2.91	3.05	0.601 (NS)
Exposure to toxin	2.82	2.93	0.691 (NS)
Heavy alcohol intake	3.00	2.88	0.668 (NS)
Old age	3.64	3.70	0.714 (NS)
Heavy smoker	2.82	2.71	0.707 (NS)

***NS: Not Significant**

***S: Significant**

CHAPTER 5

DISCUSSION

5.1 Response Rate

290 respondents out of the chosen 355 respondents participated in our study, giving us a response rate of 81.69%. Table 4.5 shows the distribution and frequency of our respondents' age, gender, ethnicity, undergraduate course, year of study, family income status and family members with AD. Based on the age of our respondents and their year of study, we can safely conclude that most of our respondents were from the preclinical level of studies or were in their earlier years of undergraduate studies. These students were not involved in clinical practices as well as research hence, they were able to give their full cooperation and participated in this research. However, for the respondents of other age groups and years of study, most of them were unable to participate in this research as they had different curricular structure and examination schedule than most preclinical and undergraduates in earlier years of studies.

From the table, we can conclude that 78.6% of our respondents were from the age group of 19-21 years of age and were from the first year of their undergraduate studies. 71.7% of our respondents were females and 54.8% of them were Malays. This was due to the dense population of the female gender and the Malay ethnicity among the undergraduates in FMHS, UPM. Forty-one percent (41%) of the respondents were coming from families with income categorized under M40 thus, most of the respondents were coming from middle class families. Seventy-six point six percent (76.6%) of our respondents were from the Doctor of Medicine course and this significantly affected our study as there has been a clear imbalance in participation from students of other undergraduate studies so, the average ADKS in this research is not conclusive for all FMHS, UPM students. Ninety-six point two percent (96.2%) of respondents did not have any family members with AD and this too would significantly affect the ADKS as these respondents might not have any in-depth understanding and knowledge regarding AD other than what they might have accidentally, willingly or incidentally read or heard about.

5.2 Association between sociodemographic factors and the knowledge of AD.

We studied the association between sociodemographic factors (age, ethnicity, gender, course of study, year of study, family income status, family members with AD) with the knowledge of AD. In our study, we recruited 290 respondents and the overall mean ADKS score was 59.17%. We had found that 252 respondents (86.90%) answered at least 15 questions correctly. In comparison with the previous

study, their research found that 50% of the respondents answered correctly on the assessment for knowledge of AD (Connell et al., 2007).

Our results showed that there was a significant association ($p=0.023$) between the age and knowledge of AD. There was a previous study that showed that older students would have better knowledge on AD. (Scerri, 2013) However, there was another study that revealed that age was not significantly associated with knowledge of AD. (Howell et al., 2015) In our study, there was a possibility that older students had learnt the basic medical science deeper.

Besides, our study found that there was a significant association between gender ($p=0.034$) and knowledge of AD. However, in a previously conducted study, there was no significant association between gender and knowledge of AD. (Baral, Dahal & Pradhan, 2020) Another study also showed that there was no significant association between gender and knowledge of AD. (Howell et al., 2015) Our findings could be explained by the uneven recruitment along gender categories. There were more female students (71.7%) involved in our study. As a result, the higher score of female students with better knowledge of AD will increase the mean ADKS score of female students.

From our study, it was also found that there was a significant association ($p=0.029$) between ethnicity and knowledge of AD. A study stated that Malays would have better knowledge on AD because of the higher prevalence of AD among Malays. (Mat Nuri et al., 2017 cited Kua and Kuo, 1995; Kadir et al., 1997; Tey et al., 2016) The better knowledge of AD may be due to their experience in handling family members with AD. The possible reason for Malays to have the lowest mean ADKS score in our study could be because most of the respondents were in Year 1 students from the Doctor of Medicine course hence, they have had less than one year of experience in the medical science field. In other words, the significant association may be in part explained by year of study. The higher their year of study, the better they would master the knowledge. Besides, since most of our respondents responded saying that they did not have family members with AD, they could not have possibly been exposed to caregiving for AD patients thus, they were not equipped with proper knowledge on AD.

Next, the results of our study showed that there was no statistical significance ($p=0.888$) between course of study and knowledge of AD. In contrast to our study, a previous study showed that medical students tend to have better knowledge on AD (Al Arifi, 2020). Besides, it was found that final year medical students had a higher percentage of correct ADKS as compared to final year pharmacy students (Scerri, 2017). In our study, the findings might have been affected due to the CoVID-19 pandemic as it

might have caused the lack of practical sessions or clinical training for medical students leading to their lower ADKS.

Furthermore, our study showed that there was a significant association ($p=0.033$) between years of study and knowledge of AD. There was a study that indicated the mean ADKS of first-year medical students was lower than that of the final year students. Their study found that those that had been educated about dementia by different means like attending class on dementia would have better knowledge of dementia (Sharma et al., 2018). Another study showed a large number of second and third-year nursing students who had training in dementia care scored higher mean ADKS scores than first-year nursing students (Scerri, 2013). Students who were in Year 5 scored the highest mean ADKS score in our study. This could be due to their clinical experience and the clinical classes on dementia.

Our study also found no association ($p=0.948$) between family income status and knowledge of AD. According to a study, there was no significant association between family income and knowledge of AD (Howell et al., 2015). This could be due to the fact that nowadays everyone has equal access to knowledge regardless of family income status. The communication service providers in Malaysia provided free high-speed internet of 1 GB per day to their customers during CoVID-19 pandemic. This assisted students to have access to online learning resources and could attend online classes.

Other than that, our study revealed that there was no significant association ($p=0.781$) between having family members with AD and knowledge of AD. A study had shown that having family members with AD was not significantly associated with knowledge of AD. (Sharma et al., 2018) In another study, only 0.95% of the respondents had at least one family member with AD with a mean ADKS of 15. This revealed that there was no significant difference in knowledge scores between those who had at least one family member and those who did not, with a mean of 15.4 (Baral, Dahal & Pradhan, 2020). However, a previous study revealed that nursing students who had family members with AD got a higher ADKS than those who did not have any family members with AD (Scerri, 2013). In our study, our findings could be due to students not being directly involved in taking care of family members with dementia.

Our study reported a mean ADKS of 59.17% from 100% among FMHS undergraduate students. It may suggest, students have a good knowledge about AD but further investigation is needed to verify it. Based on a research done in the Hospital Universitario Ramon y Cajal, Madrid, Spain, the caregivers and non-caregivers in the hospital had a mean ADKS of 70.6% and by comparison, the mean score of undergraduates in FMHS, UPM is relatively lower. (Garcia-Ribas G., et. al., 2020) Besides, the data

collected had a significant imbalance between the undergraduates from the Doctor of Medicine course and other undergraduate courses as well as from the preclinicals or earlier years of study and students from clinical years and later years of studies. These data very much affected our study results and analysis.

5.3 Association between sociodemographic factors and the perception on AD

In our research, the respondents were asked to choose the importance of each risk factor which were genetics, mental illness, stress, God's will, head injury, exposure to toxin, heavy alcohol intake, old age and heavy smoker, to contribute to AD. Compared to previous research, almost 50% of their respondents indicated that genetics and old age were important risk factors leading to AD. They also revealed that 40% of the respondents chose God's will as an important risk factor contributing to AD and more than 60% of the respondents thought exposure to toxins was not an important risk factor for AD (Glover et al., 2019). As for our research, the respondents chose old age as the most important risk factor contributing to AD. Conversely, the respondents believed that heavy smokers or smoking too much was the least important risk factor contributing to AD.

From the frequency data that has been analysed, the majority of the respondents believed that genetics, God's will, head injury and old age were extremely important risk factors that contributed to AD. The other items which were mental illness, stress, exposure to toxin, heavy alcohol intake and heavy smoker were indicated as very important risk factors leading to AD. Out of all these items, the risk factor of old age showed the most significant difference between the ones who answered it as an extremely important factor and the others who indicated that this risk factor was not the most important factor. This proved that most of the undergraduate students in FMHS, UPM believed that AD was highly associated with aging.

Results from the one-way ANOVA test showed the association between the sociodemographic factors and the respondents' perception on AD. Out of 7 sociodemographic factors included, two of them which were gender and having family with AD did not have any significant association with the respondents' perception towards risk factors that could contribute to AD. In terms of gender, it could be seen that the difference between female and male respondents did not affect their perception on AD. Previous study stated that there were differences in mental and cognitive abilities such as perception between females and male (Guragain and Upadhyay, 2014). However, in our study, there was no significant association between gender and their perception on AD. This may be explained by their exposure to medical science. In our research, the majority of respondents (79%) were Year 1 and Year 2

medical students. They received the same input or knowledge in the class, therefore they may have the same perception.

The same applies to having family members with AD. There was no difference between the people who have family members with AD and those who did not have any family members with AD and this might be caused by various factors. A study mentioned that reducing the stigma and increasing awareness of dementia among youth in Malaysia can be achieved by increasing the level of contact to the people that have dementia (Griffiths et al., 2020). We predicted that they might not live with these family members with AD or be a caregiver to their family members with AD. This might have caused them to have had the same perception as the ones who did not have any family members with AD.

In terms of age group, the previous study had slightly different age groups compared to our research. This is because they had respondents from older age groups thus, it might have caused the difference in the results. From their analysis for association between age and perception on AD, there was a statistically significant difference between the younger and older age groups relating to their perception of risk factors mental illness, God's will and exposure to toxins (Glover et al., 2019). As for our research, there was a statistically significant association between the age groups and the perception of God's will and old age as risk factors leading to AD. The significant association between age groups and perception on AD among respondents could be caused by different ways of thinking among the respondents considering they were in different age groups.

In terms of ethnicity, there was a significant association between different ethnicities and their perception towards mental illness and God's will as the risk factors causing AD. The differences might be caused by the respondents' living in different environments and their upbringing. Since different ethnicities have their own beliefs and culture, this might have caused them to have different perceptions on AD. The influence of culture and religion was relatively strong as the majority of respondents believed that God's will was an important risk factor for AD. Another possible contributing factor was Malaysians lack awareness about AD, therefore they may believe the pronounced role of God's will as a source for knowledge. This statement could be proved by a study that mentioned the difference between traditional Chinese and Western people's understanding about dementia. Traditional Chinese tend to believe that symptoms of dementia were related to imbalance of "yin" and "yang" energy forms and they preferred treatment by herbalists and acupuncturists (Elliott et. al., 1996).

In terms of years of education, a previous study revealed that there was a statistically significant association between years of education and perception of God's will and heavy alcohol intake as risk factors for AD (Glover et al., 2019). As in our study, there was a statistically significant association between years of study and the perception of God's will, heavy alcohol intake, old age and heavy smokers as risk factors that will lead to AD. The difference in perception on AD among the respondents in different years of study might be affected because they learnt different syllabus in different years. There was a possibility that the depth in understanding towards AD was different. For example, second-year medical students would focus on the pharmacologic aspect of AD as compared to final year medical students. Their basic knowledge in medical science may vary accordingly too. This would influence their understanding toward AD.

Next, having different courses of study also showed a significant association with their perception of heavy smokers as the risk factors causing AD. Previous study also stated that there was a significant difference between perception of dementia and the respondents' education (Eun, 2017). Even though they were all undergraduate students who we expected to have basic medical knowledge, their study outline may vary according to their respective course thus, it caused them to have different perceptions on AD. For example, medical students would need to learn about Alzheimer's disease deeper than the other courses.

Last but not the least, respondents who had different family income status showed significant association with their perception of mental illness and God's will as risk factors for AD. This could be related to them having different family backgrounds, causing them to have different exposure and awareness regarding AD. A previous study mentioned that family socioeconomic status did have an effect on individual neural and cognitive development (Takeuchi et al., 2019).

In summary, age, ethnicity and year of study were significantly associated with both knowledge and perception about AD. Courses of study and family income status did not have significant correlation with knowledge of AD but they were significantly associated with perception about risk factors of AD. Gender was found to be significantly associated with knowledge of AD but not perception about risk factors of AD. Having family members with AD did not have a positive impact on perception about risk factors of AD and knowledge of AD.

CHAPTER 6

CONCLUSION, STRENGTH, LIMITATION AND RECOMMENDATION

6.1 Conclusion

We were able to reach a response rate of 81.69% from 290 respondents out of the 355 respondents who were chosen randomly from the 1370 undergraduates from FMHS, UPM. This study reported a mean AD knowledge score of 59.17% from 100% and it cannot be categorized as there is no set baseline to assess the knowledge and categorize it as good, acceptable or poor. However, based on a research done in the Hospital Universitario Ramon y Cajal, Madrid, Spain, the caregivers and non-caregivers in the hospital had a mean ADKS of 70.6% and by comparison, the mean score of undergraduates in FMHS, UPM is relatively lower. (Garcia-Ribas G., et. al., 2020) Besides, the data collected had a significant imbalance between the undergraduates from the Doctor of Medicine course and other undergraduate courses as well as from the preclinicals or earlier years of study and students from clinical years and later years of studies. These data very much affected our study results and analysis. Based on the data collected, we were able to achieve our study objective(s). Overall, from the above data, we can conclude that undergraduates of the female gender, who has/had a family member with AD, of the ethnicity other than Malay, Chinese or Indian, from the age category of 24-25, took the Nutrition and Community Health course, were in the 5th year of studies and were from a family with income categorized under M40 respectively had significantly higher scores than the other respondents. Old age was thought to be the most important factor contributing to AD while heavy smoker was considered the least important factor as a whole. Among all the sociodemographic factors, only gender and having family with AD did not have any significant association between their groups with their perception towards risk factors causing AD. These results indicate that there is a significant association between the sociodemographic factors studied with the knowledge and perception on AD among the undergraduate students of FMHS, UPM.

6.2 Strength

To our knowledge, this is the very first study done in Malaysia that relates both the knowledge and perception on AD among undergraduates in the same study. This is a very important topic as AD is a disease that has a significantly increasing number of prevalence among all populations worldwide and this is very concerning since it is incurable. The prevalence of this disease is likely to escalate in the next few decades as the world's population is aging. Furthermore, assessing the knowledge and perception on AD among FMHS, UPM students and later bringing awareness on this topic is significant since they will be working in the healthcare and medical line or related services in the future. This will dramatically

improve the healthcare services provided to patients with AD and will eventually help improve the situation.

6.3 Limitations

The major limitation faced in this study was the time frame for the data collection was short and was set to three weeks only as we had time constraints in getting the JKEUPM approval and collecting sufficient responses for our research . On top of that, the worsening CoVID 19 situation has caused most of the students to stay at home and undergo online studies. It has also impacted the students' mental health and capability to handle stressful situations. This too played a significant role in preventing us from getting adequate responses as most students were either having a burnout or did not pay attention to the messages our group sent while staying at home. Lastly, due to the difference in curricular structure as well as examinations schedules, we were not able to get the full participation from the undergraduates in clinical yeast or later years of studies.

6.4 Recommendation for future study

We recommend to future researchers who plan to conduct the same study to allocate a reasonable time and set a well-planned time frame for data collection based on the associated factors that are studied. In our study, we truly believe the time allocated for data collection was insufficient as we did not plan the data collection phase cohesively and faced time constraints, causing us to not have met our targeted number of responses (355 responses). Furthermore, the time frame chosen was not suitable as well since most clinical students and students from later years of study were unable to give their cooperation and participate in our study even after multiple persuasions and requests as they had different schedules from the rest of the undergraduates. The components used for this questionnaire which were adapted from previous studies (Carpenter et al., 2009; Glover et al., 2019) can be improvised as well by including another language like Bahasa Malaysia so that the questions could be more comprehensible. The factors contributing to AD under the perception section could be included with descriptions so that the respondents can clearly picture the scenarios. Moreover, this research could be done extensively on other medical and health sciences students in other universities and healthcare professionals to assess and standardize their knowledge and perception on AD to provide better healthcare services to patients with AD or any form of neurodegenerative diseases, for that matter of fact. This research could also be carried out among the public if needed to raise their awareness on AD and neurodegenerative diseases (through campaigns that can be launched based on their answers to the questionnaire or educate them by simply revealing their AD knowledge score) so that they would seek immediate medical help in the future if they are able to detect the signs and symptoms of AD.

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Appendices

Appendix A- Work Plan

Table 1: Gantt Chart

No	Activities	Time									
		October (2020)	November (2020)	December (2020)	January (2021)	February (2021)	March (2021)	April (2021)	May (2021)	June (2021)	July (2021)
1.	Preparation of proposal										
2.	Submission of proposal										
3.	Proposal Presentation										
4.	Preparation of Ethical Approval										
5.	Data collection and analysis										

6.	Submission of data analysis report										
7.	Presentation of data analysis										
8.	Report writing and poster preparation										
9.	Submission of the final report and scientific articles										
10.	Poster Presentation										
11.	Preparation for final presentation										
12.	Final										

	presentation										
13.	Submission of logbook										



Appendix B - Other Sample Size Estimation

Objectives	Formula	Sample size	Reference
To determine the prevalence of knowledge of AD	$n = \frac{(Z_{1-\alpha})^2 P_x(1-P)}{d^2}$ P=0.645	n=352	Scerri (2013)
To determine the prevalence of perception of AD	P=0.55	n=380	Algahtani et al., 2018
To determine the association between level of knowledge and year of study.	$n = \frac{\{[z(1-\alpha/2)*\sqrt{2P(1-P)}] + [z(1-\beta)*\sqrt{P_1(1-P_1) + P_2(1-P_2)}]^2}{(P_1-P_2)^2}$ P ₁ =0.63 (final year) P ₂ =0.50 (first year)	n=244	Sharma et al., 2018
To determine the association between level of knowledge and experience with Alzheimer's disease	P ₁ =0.284 P ₂ =0.636	n=258	Algahtani et al., 2018

Appendix C - Questionnaire

Knowledge and Perception on Alzheimer's Disease among Undergraduate Students in the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia

Good day, everyone! We are from Research Project (MDR 3201) Group 10, 2nd Year Medical Students of Universiti Putra Malaysia and we are conducting research on the knowledge and perception on Alzheimer's disease (AD) among Undergraduate Students in the Faculty of Medicine and Health Sciences (FMHS), Universiti Putra Malaysia (UPM). This survey will assess your basic knowledge on AD and your perception about this disease. The total expected time to answer this questionnaire will be from 5 to 10 minutes.

The purpose of this study is to:

1. To determine the relationship between age, and knowledge and perception of AD among undergraduate students of FMHS in UPM.
2. To determine the relationship between gender, and knowledge and perception of AD among undergraduate students of FMHS in UPM.
3. To determine the relationship between ethnicity, and knowledge and perception of AD among undergraduate students of FMHS in UPM.
4. To determine the relationship between year of study, and knowledge and perception of AD among undergraduate students of FMHS in UPM.
5. To determine the relationship between course of study, and knowledge and perception of AD among undergraduate students of FMHS in UPM.
6. To determine the relationship between family income status, and knowledge and perception of AD among undergraduate students of FMHS in UPM.
7. To determine the relationship between having family members with AD, and knowledge and perception of AD among undergraduate students of FMHS in UPM.

This survey consists of 5 parts in total with questions in 3 sections:

Section A: Socio-demographic of respondents

Section B: Knowledge on AD

Section C: Perception on AD

All questions are mandatory to be answered and there might be exceptions to some. All personal information given in this questionnaire will be protected and used in this study and preparation of study paper and will not be published elsewhere.

Your time and cooperation are much appreciated. Thank you!

Researchers :

RASHIKA A/P SIVANESAN (200960)

NUR IMAN NAJIAH BT ABDUL RAZAK (200567)

NG CHEE HAN (200771)

Email address :

I agree and give consent to use the given personal information/perception for this research.

- ☐ Agree
- ☐ Disagree

Section A : Socio-demographic factors

1. Age

2. Gender

- ☐ Male
- ☐ Female

3. Ethnicity

- ☐ Malay
 - ☐ Chinese
 - ☐ Indian
 - ☐ Others
-

4. Year of study

- ☐ Year 1
- ☐ Year 2
- ☐ Year 3
- ☐ Year 4
- ☐ Year 5

5. Course of study

- ☐ Doctor of Medicine
- ☐ Bachelor of Biomedical Sciences with Honors
- ☐ Bachelor of Science Environmental and Occupational Health with Honors
- ☐ Bachelor of Science Dietetic with Honors
- ☐ Bachelor of Science Nutrition and Community Health with Honors
- ☐ Bachelor of Nursing

6. Family income status

- ☐ B40
- ☐ M40
- ☐ T20

7. Do you have any family members with Alzheimer's disease?

- ☐ Yes, I have
- ☐ No

Section B : Knowledge on Alzheimer's disease

Source : Carpenter, B. D., Balsis, S., Otilingam, P. G., Hanson, P. K., & Gatz, M. (2009). The Alzheimer's Disease Knowledge Scale: Development and Psychometric Properties. The Gerontologist, 49(2), 236–247. <https://doi.org/10.1093/geront/gnp023>

Please answer all questions.

1. People with AD are particularly prone to depression.

- ☐ True
- ☐ False

2. It is safe for people with AD to drive, as long as they have a companion in the car at all times.

- ☐ True
- ☐ False

3. Tremor or shaking of the hands or arms is a common symptom in people with AD.

- ☐ True
- ☐ False

4. Alzheimer disease cannot be cured.

- ☐ True
- ☐ False

5. If trouble with memory and confused thinking appears suddenly, it is likely due to AD.

- ☐ True
- ☐ False

6. Alzheimer disease can cause dementia.

- ☐ True
- ☐ False

7. Trouble handling money or paying bills is a common early symptom of AD.

- ☐ True
- ☐ False

8. Poor nutrition can make the symptoms of AD worsen.

- ☐ True
- ☐ False

9. Eventually, a person with AD will need 24-hr supervision.

- ☐ True
- ☐ False

10. In rare cases, people have recovered from AD.

- ☐ True

☐ False

11. It has been scientifically proven that mental exercise can prevent a person from getting AD.

☐ True

☐ False

12. After symptoms of AD appear, the average life expectancy is 6 to 12 years.

☐ True

☐ False

13. When a person with AD becomes agitated, a medical examination might reveal other health problems that caused the agitation.

☐ True

☐ False

14. People with AD do best with simple instructions given one step at a time.

☐ True

☐ False

15. When people with AD begin to have difficulty taking care of themselves, caregivers should take over right away.

☐ True

☐ False

16. If a person with AD becomes alert and agitated at night, a good strategy is to try to make sure that the person gets plenty of physical activity during the day.

☐ True

☐ False

17. People whose AD is not yet severe can benefit from psychotherapy for depression and anxiety.

☐ True

☐ False

18. Most people with AD live in nursing homes.

- ☐ True
- ☐ False

19. People in their 30s can have AD.

- ☐ True
- ☐ False

20. A person with AD becomes increasingly likely to fall down as the disease gets worse.

- ☐ True
- ☐ False

21. When people with AD repeat the same question or story several times, it is helpful to remind them that they are repeating themselves.

- ☐ True
- ☐ False

22. Once people have AD, they are no longer capable of making informed decisions about their own care.

- ☐ True
- ☐ False

23. Having high cholesterol may increase a person's risk of developing AD.

- ☐ True
- ☐ False

24. Symptoms of severe depression can be mistaken for symptoms of AD.

- ☐ True / Betul
- ☐ False / Salah

25. One symptom that can occur with AD is believing that other people are stealing one's things.

- ☐ True
- ☐ False

26. When a person has AD, using reminder notes is a crutch that can contribute to decline.

- ☐ True
- ☐ False

27. Prescription drugs that prevent AD are available.

- ☐ True
- ☐ False

28. Having high blood pressure may increase a person's risk of developing AD.

- ☐ True
- ☐ False

29. Genes can only partially account for the development of AD.

- ☐ True
- ☐ False

30. Most people with AD remember recent events better than things that happened in the past.

- ☐ True
- ☐ False

Section C : Perception on Alzheimer's disease

Source : Glover, C. M., CoCroft, S., James, B. D., & Barnes, L. L. (2019). Perceptions of Risk Factors for Alzheimer Disease Among Community-Dwelling, Nondemented Older African Americans. *Alzheimer Disease & Associated Disorders*, 33(3), 254–259. <https://doi.org/10.1097/wad.0000000000000314>

Please answer based on what you think about these risk factors of Alzheimer's disease.

1 : Not important at all

2 : Somewhat important

3 : Very important

4 : Extremely important

1. Genetics

1 2 3 4

2. Mental illness

1 2 3 4

3. Stress

1 2 3 4

4. Old age

1 2 3 4

5. God's will

1 2 3 4

6. Head injury

1 2 3 4

7. Exposure to toxins

1 2 3 4

8. Heavy alcohol intake

1 2 3 4

9. Heavy smoker

1 2 3 4

Thank you for filling up this form. Your support is very much appreciated.

If you have any enquiries or question, you can contact one of us :

1. Rashika A/P Sivanesan : 200960@student.upm.edu.my
2. Nur Iman Najihah Abdul Razak : 200567@student.upm.edu.my
3. Ng Chee Han : 200771@student.upm.edu.my

Do you wish to know the result of the study? The result will be sent to you through email after the study ends.

- ☐ Yes
- ☐ No

Appendix D - Approval letter

Rujukan : UPM/ FPSK/ MDR 3901/ GROUP 10

Tarikh : 27 Januari 2021

YBhg. Profesor Dr Zamberi Sekawi

Dekan

Fakulti Perubatan dan Sains Kesihatan Universiti Putra Malaysia,

43400 UPM Serdang,

Selangor Darul Ehsan. Malaysia.

Yang berbahagia Prof,

PERMOHONAN KEBENARAN UNTUK MENJALANKAN KAJIAN BAGI PELAJAR TAHUN 2, PROGRAM DOKTOR PERUBATAN, FAKULTI PERUBATAN DAN SAINS KESIHATAN, UNIVERSITI PUTRA MALAYSIA.

Dengan segala hormatnya perkara di atas adalah dirujuk,

2. Sukacita dimaklumkan bahawa pelajar doktor perubatan tahun 2 ingin menjalankan suatu kajian bertajuk “**Knowledge and Perception on Alzheimer’s Disease among Undergraduate Students in the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia**”.

3. Kajian ini dijalankan bertujuan untuk memenuhi keperluan asas Kursus Projek Penyelidikan (MDR 3901) di mana pelajar yang menjalankan kajian ini akan membentangkan hasil kajian penyelidikan di fakulti. Berikut adalah nama-nama pelajar yang terlibat:

No	Nama	No matrik
1.	Rashika A/P Sivanesan	200960
2.	Nur Iman Najihah bt Abdul Razak	200567
3.	Ng Chee Han	200771

Kumpulan pelajar ini akan diselia oleh saya, Dr Muhammad Zulfadli Mehat dan Dr Manraj Singh Cheema, pensyarah di FPSK, UPM.

4. Sehubungan dengan itu, kami ingin memohon kebenaran untuk menjalankan kajian ini di Fakulti Perubatan dan Sains Kesihatan, UPM. Kami juga ingin memohon untuk mendapatkan senarai nama pelajar sarjana di FPSK dari tahun 1, 2, 3, 4 dan 5 bagi sesi 2020/2021. Sebarang maklumat lanjut pihak Ybhg. Prof boleh berhubung dengan ketua kumpulan ini iaitu Nur Iman Najihah di talian 011-56793527 atau emel : 200567@student.upm.edu.my

Segala kerjasama dan perhatian dari pihak tuan amat kami hargai dan kami dahului dengan ucapan ribuan terima kasih.

Sekian.

"BERILMU BERBAKTI"

Yang benar,



Dr Muhammad Zulfadli bin Mehat
Jabatan Anatomi Manusia
Fakulti Perubatan dan Sains Kesihatan
Universiti Putra Malaysia



Appendix E - JKEUPM Respondent's Information Sheet and Informed Consent Form



UPM
UNIVERSITI PUTRA MALAYSIA

**JAWATANKUASA ETIKA UNIVERSITI UNTUK
PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG,
SELANGOR, MALAYSIA**

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:

Knowledge and Perception on Alzheimer's Disease among Undergraduate Students in the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia.

2. INTRODUCTION:

This study is to determine the relationship between the socio-demographic factors and the knowledge and perception on Alzheimer's disease among undergraduate students in the FMHS, UPM.

3. WHAT WILL YOU HAVE TO DO?

You need to fill in your age, gender, ethnicity, undergraduate course, year of study, family income status and if you have family members with Alzheimer's disease in the first section of the questionnaire. The second section will require you to answer a set of 30 questions about knowledge of Alzheimer's disease. The answer choices will be 'True' or 'False'. The third section will require you to answer how important the risk factors that were listed to cause Alzheimer's disease. The answer choices will be a Likert-type scale from 1 until 4. Do note that your participation is voluntary and your response will be kept confidential only for the study purpose.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

You should not participate in the study if you are not an active undergraduate student in the Faculty of Medicine and Health Sciences, UPM.

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

Once the questionnaire is completed, you will be able to assess your knowledge of Alzheimer's disease and you will also be able to assess your perception of the disease if you select to obtain research results while answering the questionnaire. To all respondents, please note that you will not receive any gifts or monetary rewards for your help.

(b) TO THE INVESTIGATOR?

After the study is done, the investigators will get to evaluate the relationship between socio-demographic factors and the knowledge and perception on Alzheimer's disease among undergraduate students in the FMHS, UPM.

6. WHAT ARE THE POSSIBLE RISKS?

There is no possible risk towards the participants answering the questionnaire because the study is conducted through an online questionnaire with no involvement of face-to-face interactions with the participants. Thus, there is no plan of compensation or insurance to the participants in this study.

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

The information that you have provided will be protected and kept confidential. Your identity will also be kept private when this research is published. Study monitor(s), auditor(s), and JKEUPM Ethics Review Panel and regulatory authorities will be granted direct access to your information only for verification of data. All the information that the participants provided will be kept in an encrypted laptop for a minimum of 3 years and then it will be destroyed permanently. The study had been approved by the JKEUPM Ethics Review Panel.

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

No	Name	Dept.	Phone no.	Email
1.	Rashika A/P Sivanesan	Bachelor of Doctor of Medicine	018-918419 3	200960@student.upm.edu .my

2.	Nur Iman Najihah binti Abdul Razak	Bachelor of Doctor of Medicine	011- 56793527	200567@student.upm.edu .my
3.	Ng Chee Han	Bachelor of Doctor of Medicine	018-409832 8	200771@student.upm.edu .my



Please initial here if you have read and understood the contents of this page_____

9. CONSENT

I 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 Signature

(Respondent)

(Witness)

Date : 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)



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**JAWATANKUASA ETIKA UNIVERSITI UNTUK
PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG,
SELANGOR, MALAYSIA**

BORANG 2.4: PENERANGAN DAN PERSETUJUAN RESPONDEN

Sila baca maklumat berikut dengan teliti. Sekiranya anda mempunyai sebarang pertanyaan, sila kemukakan kepada penyelidik.

1. TAJUK KAJIAN:

Pengetahuan dan Persepsi terhadap Penyakit Alzheimer di kalangan Pelajar Sarjana di Fakulti Perubatan dan Sains Kesihatan, Universiti Putra Malaysia.

2. PENGENALAN:

Kajian ini dijalankan untuk menentukan hubungan antara faktor sosio-demografi dengan pengetahuan dan persepsi terhadap penyakit Alzheimer di kalangan pelajar sarjana di FPSK, UPM.

3. APAKAH YANG PERLU ANDA LAKUKAN?

Anda perlu mengisi umur, jantina, bangsa, kursus sarjana, tahun pengajian, status pendapatan keluarga dan jika anda mempunyai ahli keluarga dengan penyakit Alzheimer di bahagian pertama soal selidik. Bahagian kedua akan meminta anda untuk menjawab 30 soalan mengenai pengetahuan mengenai penyakit Alzheimer. Pilihan jawapannya adalah 'Betul' atau 'Salah'. Bahagian ketiga akan meminta anda untuk menjawab betapa pentingnya faktor risiko yang disenaraikan untuk menyebabkan penyakit Alzheimer. Pilihan jawapan adalah skala jenis Likert dari 1 hingga 4. Sila ketahui bahawa penyertaan anda adalah sukarela dan respons anda akan dirahsiakan hanya untuk tujuan kajian.

4. SIAPA YANG TIDAK BOLEH MENYERTAI KAJIAN INI?

Anda tidak boleh mengambil bahagian dalam kajian ini sekiranya anda bukan pelajar sarjana aktif di Fakulti Perubatan dan Sains Kesihatan, UPM.

5. APAKAH FAEDAH MENYERTAI KAJIAN INI?

(a) KEPADA ANDA SEBAGAI PESERTA?

Setelah soal selidik dilengkapkan, anda akan dapat menilai pengetahuan anda mengenai penyakit Alzheimer dan anda juga dapat menilai persepsi anda mengenai penyakit ini sekiranya anda memilih

untuk mendapatkan hasil kajian semasa menjawab soal selidik. Kepada semua responden, harap maklum bahawa anda tidak akan menerima hadiah atau ganjaran wang atas bantuan anda.

(b) KEPADA PENYELIDIK?

Setelah kajian selesai, para penyelidik akan dapat menilai hubungan antara faktor sosio-demografi dan pengetahuan dan persepsi terhadap penyakit Alzheimer di kalangan pelajar sarjana di FPSK, UPM.

6. ADAKAH IA BERISIKO?

Tidak ada risiko yang berkemungkinan terhadap peserta yang menjawab soal selidik kerana kajian dilakukan melalui soal selidik atas talian tanpa penglibatan interaksi bersemuka dengan peserta. Oleh itu, tidak ada perancangan untuk pampasan atau insurans kepada peserta dalam kajian ini.

7. ADAKAH MAKLUMAT DAN IDENTITI SAYA KEKAL RAHSIA?

Maklumat yang anda berikan akan dilindungi dan dirahsiakan. Identiti anda juga akan dirahsiakan setelah penyelidikan ini diterbitkan. Monitor kajian, juruaudit, dan Panel Kajian Etika JKEUPM dan pihak berkuasa pengawalseliaan akan diberi akses langsung ke maklumat anda hanya untuk pengesahan data. Semua maklumat yang diberikan oleh peserta akan disimpan dalam komputer riba yang dienkripsi selama sekurang-kurangnya 3 tahun dan kemudian akan dimusnahkan. Kajian ini telah dipersetujui oleh Panel Kajian Etika JKEUPM.

8. SIAPA YANG SAYA PERLU HUBUNGI SEKIRANYA SAYA MEMPUNYAI SOALAN TAMBAHAN SEMASA MENGIKUTI PENYELIDIKAN INI?

No	Nama	Bahagian	No tel.	E-mel
1.	Rashika A/P Sivanesan	Sarjana Muda Doktor Perubatan	018-9184193	200960@student.upm.edu.my
2.	Nur Iman Najihah binti Abdul Razak	Sarjana Muda Doktor Perubatan	011- 56793527	200567@student.upm.edu.my

3.	Ng Chee Han	Sarjana Muda Doktor Perubatan	018-4098328	200771@student.upm.edu.my
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Sila tandatangan di sini sekiranya anda telah membaca dan memahami kandungan halaman ini

9. PERSETUJUAN

Saya No Kad Pengenalan.
beralamat.....
..... dengan ini bersetuju untuk mengambil bahagian secara sukarela dalam penyelidikan yang tersebut di atas *(kajian klinikal/percubaan ubat-ubatan/rakaman video/kumpulan sasaran/temuduga/ soal selidik).

Saya telah diberi penjelasan secara menyeluruh mengenai penyelidikan ini dari segi metodologi, risiko dan komplikasi (seperti tertulis pada Helaian Penerangan Responden). Saya memahami bahawa saya berhak menarik diri dari penyelidikan ini pada bila-bila masa tanpa memberi sebarang alasan. Saya juga memahami bahawa sebarang maklumat yang berkaitan identiti saya akan dirahsiakan.

Saya* berminat / tidak berminat untuk mengetahui keputusan kajian yang melibatkan saya.

Saya setuju/tidak bersetuju untuk imej/gambar/rakaman video/ rakaman suara digunakan dalam apa jua bentuk penerbitan atau pembentangan. (sekiranya berkaitan).

*potong yang tidak berkenaan

Tandatangan Tandatangan

(Responden)

(Saksi)

Tarikh : Nama :

No. K/P:

Saya mengesahkan bahawa saya telah menerangkan kepada responden ini sifat dan tujuan penyelidikan yang tersebut di atas.

Tarikh

Tandatangan

(Penyelidik)

Appendix F - JKEUPM Approval Letter

Ref. no: UPM/TNCPI/RMC/JKEUPM/1.4.18.2 (JKEUPM)

Date: 8 April 2021

Dear Prof./Dr./Mr./Ms.,

APPLICATION FOR JKEUPM ETHICAL CLEARANCE: APPROVED

With reference to the above, I am pleased to inform you that your application for ethical clearance for the research project entitled **‘Knowledge and Perception on Alzheimer's Disease among Undergraduate Students in the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia’** has been approved.

Please note that the official letter of approval will be issued as soon as possible. However, the ethical clearance is considered effective from the date of this email, and you may now proceed with your research.

Kindly remind the ethical approval is required in the case of amendments/ changes to the study documents/ study sites/ study team.

Researchers should also complete a Study Final Report upon study completion. The form can be obtained from the Ethics Committee for Research Involving Human Subjects (JKEUPM) website (<http://www.tncpi.upm.edu.my/faildokumen>).

If you have any enquiries, please contact Ms. Nurulhasanah Ishak (03-97691605) or Ms. Nor Ellia Abd Ajis (03-97691244).

Note: Please use this reference number for any transaction:- **JKEUPM-2021-100**

Thank you.

Yours faithfully,

Prof. Dr. Zamberi Sekawi
Chair
Ethics Committee for Research Involving Human Subjects
Universiti Putra Malaysia

Appendix G - JKEUPM Final Report Form**JAWATANKUASA ETIKA UNIVERSITI UNTUK PENYELIDIKAN
MELIBATKAN MANUSIA (JKEUPM)****UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG,
SELANGOR, MALAYSIA****FORM 3.2: STUDY FINAL REPORT**

1.	JKEUPM Ref. No.	JKEUPM-2021-100
2.	Study Title	Knowledge and Perception on Alzheimer's Disease among Undergraduate Students in the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia
3.	i. Principal investigator a. Name b. Address c. Tel.No d. Email ii. List of co-investigators	i. Principal investigator: Name: Dr Muhammad Zulfadli Mehat Address: Faculty of Medicine and Health Sciences Universiti Putra Malaysia 43400 UPM Serdang, Selangor Tel. No: 03-9769 2782 Email: m_zulfadli@upm.edu.my ii. List of co-investigators: 1. Dr Manraj Singh Cheema 2. Rashika A/P Sivanesan (200960) 3. Nur Iman Najihah Bt. Abdul Razak (200567) 4. Ng Chee Han (200771)
4.	Name Of Funding Agency	-
5.	Study Site	Faculty of Medicine and Health Sciences, Universiti

		Putra Malaysia
6.	Total number of eligible subjects in study site	1370



7.	Recruitment of subjects in study site i. Number of participants recruited: ii. Number of participants completing trial/ study: iii. Proposed in original application: iv. Number of withdrawals from trial to date due to: a) withdrawal of consent b) no response from participants c) loss to follow-up d) death (not the primary outcome) Total study withdrawals: v. Number of treatment failures to date (Prior to reaching primary outcome) due to: a) adverse events	i. 290 ii. 50 iii. 355 iv. a) 0; b) 65; c) 0; d) 0 v. Not applicable
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	b) lack of efficacy Total treatment failures:	
8.	Duration of study	6 months
9.	Protocol Violation or Deviation	-

10.	Executive summary (Summary of research background, objectives, methodology, findings and conclusion of the research project) - maximum 500 words) *Committee may request additional information if required.	Introduction: In Malaysia it has been estimated that 63,000 persons will have dementia, with an average occurrence of 20,100 individuals in 2005 and will rise to about 126,800 total dementia cases, with 39,000 annual new cases by 2020. The primary underlying cause of dementia is Alzheimer's disease (AD) which is also the most prevalent neurodegenerative disease in Malaysia and worldwide. Objective: This study aimed to determine the relationship between the sociodemographic factors which were age, gender, ethnicity, family income, year of study, course of study and family members with AD and the level of knowledge and perception on AD among undergraduate students in the FMHS, UPM. Materials and methods: A cross sectional study was done where the participants for this study were chosen via simple random sampling. The online questionnaire consisted of three sections which were: (1) socio-demographic factors; (2) knowledge on AD; and (3) perception on AD among undergraduate students in the FMHS, UPM. The data was analysed using the Statistical Package for Social Science program (SPSS). Independent T-test and one-way ANOVA test was conducted to identify factors associated with knowledge and perception on AD among respondents. Results: Majority of the respondents were 19-21 years old, female, Malay, in their first year of study, studying Medicine, in M40 family income status and had no family with AD. The overall mean ADKS was 59.17%. Our result had shown that age, gender, ethnicity and year
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