LIM SHI QI

A CROSS-SECTIONAL STUDY ON THE KNOWLEDGE OF KNEE OSTEOARTHRITIS AND ATTITUDE TOWARDS PREVENTION OF KNEE OSTEOARTHRITIS IN YOUNG ADULTS

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BACHELOR OF PHYSIOTHERAPY (HONOURS)

UNIVERSITI TUNKU ABDUL RAHMAN

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By

LIM SHI QI

A Research project submitted to the Department of Physiotherapy,
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A CROSS-SECTIONAL STUDY ON THE KNOWLEDGE OF KNEE OSTEOARTHRITIS AND ATTITUDE TOWARDS PREVENTION OF KNEE OSTEOARTHRITIS IN YOUNG ADULTS

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ABSTRACT

Background and Objectives: Osteoarthritis (OA) is a cartilage degenerative condition that causes the joints to deteriorate, and it can attack younger individuals (mostly athletes or with joint trauma). Knee OA led to various issues and compared to the younger population, the seniors have substantially more awareness and knowledge of knee OA. This study aims to determine the knee OA knowledge level and the attitude toward knee OA prevention in young adults.

Methods: A cross-sectional study with 380 young adults aged from 17 to 28 years old. An online survey using the Knee Osteoarthritis Knowledge Scale (Knee OAKS) by Darlow et al. (2023) and two modified questionnaires of knowledge and attitude towards knee OA prevention.

Results: The number of 380 young participants with 53.7% female and 46.3% male, the majority from the 21-24 age group. Gender analyse with Mann-Whitney test and other variables analyse with Kruskall-Wallis test. Gender showed a significant difference in Knee OAKS ($p = 0.008$). No relationship was found between race ($p = 0.175$), educational levels ($p = 0.176$), and family income levels ($p= 0.966$) with Knee OAKS respectively. The gender ($Z = -0.593$, $p = 0.553$), race ($p = 0.968$), educational levels (0.170), and family income level (0.207) show no significant association with knee OA prevention knowledge. There is no relationship between Knee OAKS and each item from attitudes towards knee OA prevention questionnaire ($p = 0.722$; $p = 0.931$; $p = 0.956$; $p = 0.475$; $p = 0.353$; $p = 0.897$; $p = 0.404$) with Kruskall-Wallis test.

Conclusion: This study highlights that gender significantly impacts knowledge of knee OA. Race, educational level, and family income showed no significant influence on knowledge or attitudes toward knee OA

prevention. Knowledge alone does not significantly influence attitudes toward knee OA prevention, underscoring the need to address both factors independently.

Keywords: Knee Osteoarthritis, Young adults, Knowledge, Attitude

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APPROVAL SHEET

This Research project entitled "**A CROSS-SECTIONAL STUDY ON THE KNOWLEDGE OF KNEE OSTEOARTHRITIS AND ATTITUDE TOWARDS PREVENTION OF KNEE OSTEOARTHRITIS IN YOUNG ADULTS**" was prepared by LIM SHI QI and submitted as partial fulfilment of the requirements for the degree of Bachelor of Physiotherapy (HONOURS) at Universiti Tunku Abdul Rahman.

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PERMISSION SHEET

It is hereby certified that **LIM SHI QI** (ID No: **22UMB06018**) has completed this Research project entitled "A CROSS-SECTIONAL STUDY ON THE KNOWLEDGE OF KNEE OSTEOARTHRITIS AND ATTITUDE TOWARDS PREVENTION OF KNEE OSTEOARTHRITIS IN YOUNG ADULTS" under the supervision of MS MAHADEVI A/P MUTHURETHINA BARATHI (Supervisor) from the Department of Physiotherapy, Faculty of Medicine and Health sciences.

Yours truly,

(LIM SHI QI)

DECLARATION

I hereby declare that the Research project is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UTAR or other institutions.

Name: Lim Shi Qi

Date: 20/12/2024

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LIST OF ABBREVIATIONS

OA	Osteoarthritis
OAKS	Osteoarthritis Knowledge Scale
ACL	Anterior Cruciate Ligament
BMI	Body Mass Index
QR code	Quick Response code
MOE	Margin of Error
SEM	Standard Error of Measurement
SDC	Smallest Detectable Change
SERC	Scientific and Ethical Review Committee
UTAR	Universiti Tunku Abdul Rahman
SPSS	Statistical Package for the Social Sciences
n	frequency
M	Mean
SD	Standard Deviation
p	P value (Significance)

CHAPTER 1

1.0 INTRODUCTION

CHAPTER OVERVIEW

The background information provided at the beginning of this chapter highlights the significance of treating osteoarthritis (OA) in the knee and preventing it as a serious public health issue. It then followed by operational definitions, rationale of study, scope of study, and problem statement. The chapter ends with the research questions and objectives, which describe the precise goals of the study. This chapter establishes the study's relevance and direction by offering a thorough framework.

1.1. BACKGROUND

Among the musculoskeletal disorders, osteoarthritis (OA) is one of the major contributors to disability living for many years (World Health Organization, n.d.). The degenerative condition known as osteoarthritis (OA) is defined by the cartilage that causes the joints to degenerate and then puts the bones in contact with one another (Saeed et al., 2019). OA is commonly involved in the shape of the bone changes, then it will form inflammation which causes pain while moving and continues forming into joint stiffness. OA can be broadly divided into two categories: primary and secondary. Idiopathic or primary OA is a genetically determined illness. Many investigations have shown that primary OA has a significant genetic component, most likely because the condition is polygenic (Musumeci et al.,

2015). Post-traumatic OA, another name for secondary OA, usually develops sometime after a traumatic incident. Inflammatory and healing mechanisms that follow the initial traumatic insult and subsequent surgery will aggravate secondary OA (Musumeci et al., 2015). Besides that, OA is a popular and common joint disease in elderly populations around the world (Heidari, 2011). OA is more common in 70 % of the elderly who are over 55 years old (World Health Organization, n.d.). Males and females aged 60 years old or older have knee OA symptoms with percentages of 10% and 13% respectively (Heidari, 2011). OA has become a prevalent joint disease that can lead to two common areas, which are OA at the knee and hip area (Grazio & Balen, 2009). A study shows that females are more likely to get knee OA compared to males (Plotnikoff et al., 2015). It is anticipated that its prevalence will rise globally. In Malaysia, the prevalence of knee OA symptoms is 25.4% of the population in Kuala Lumpur (Mat et al.,2019). OA usually develops in the late adulthood age range from 40 years old to mid-50, but it can also occasionally strike younger people, more likely among athletes or those who are exposed to joint damage or injury (World Health Organization, n.d.).

Knee OA is a chronic disease that impairs quality of life by gradually causing impairment in a variety of articular joints. A variety of issues are linked to this condition, such as decreased mobility, diminished autonomy, weakened capacity for self-care, and difficulties carrying out daily living tasks (Clynes et al., 2019). Examples of these activities include walking, sitting, running, taking a shower, working, and other everyday activities that are necessary for day-to-day functioning. These restrictions have an impact

on patients' emotional well-being and social isolation in addition to their physical health.

About 10.4% of people worldwide suffer from knee OA, making it another common health problem. With $460 billion in medical costs yearly, it presents a significant financial burden (Lo et al., 2021) . The location of the affected body determines the cost of OA therapy; knee OA is very costly. The average cost of care for patients with knee OA is $15,599, which includes a hefty inpatient bill of $4,518 (Wang et al., 2017). These costs put a strain on patients' finances and may cause their families to face long-term financial difficulties.

Beyond the monetary cost, knee OA significantly affects employment and occupational output. The condition's economic and social repercussions are exacerbated by movement impairment and challenges with performing daily duties, which frequently lead to shortened workdays, early retirement, and final termination of employment (Sayre et al., 2010). Effective prevention, care, and support methods for people with knee OA are desperately needed, as seen by this cascade of physical, financial, and vocational difficulties.

OA of the knee is preventable and has been demonstrated by numerous studies (Mary & David, 2022) and other studies have shown the risk factors related to the development of knee OA (Heidari, 2011). There have also been studies confirming that the best way to avoid the severity or early formation of knee OA is to gain knowledge about knee OA and the prevention methods (Alahmed et al., 2023). There have been a few studies investigating the level

of knowledge of knee OA in different populations. Gulzar et al. (2023) showed that the decreased knee OA knowledge is due to insufficient awareness of knee OA among middle-aged adults. Another study by Ganasegeran et al. (2014) showed the result of 53.6% of middle-aged adults in Malaysia having poor knowledge of knee OA. Early diagnosis and proper intervention can be provided early if middle-aged adults are given more knowledge and information about knee OA (Gulzar et al., 2023).

To effectively prevent knee OA, it may be important to start paying attention to risk factors at an early age. Whittaker et al. (2021) suggest the reduction of risk factors to be started across the lifespan, including young adults 15 to 30 years old. However, at this time, there are no studies investigating the knowledge of knee OA and the attitude toward knee OA prevention in young adults. Thus, it is important to investigate the level of knowledge in younger groups about knee OA and their attitude toward the prevention of knee OA. The results from such a study will enable us to design programs or workshops to educate and provide advanced knowledge on the prevention of knee OA according to the knowledge level of knee OA and attitude toward knee OA prevention in young adults. Besides, the results provide further improvement in knee OA risk factors management and prevention of physiotherapy. Moreover, the results provide information to plan for future research in the field of knee OA and knee OA prevention. Thus, this study aims to determine the level of knowledge of knee OA and attitudes toward knee OA prevention in young adults.

1.2. OPERATIONAL DEFINITION

1.2.1. Knee OA

Knee osteoarthritis (OA) is also referred as a joint disease that causes the degeneration of the knee. It is usually caused by gradual loss of articular cartilage at the knee joint as well as wear and tear. (Hsu & Siwiec, 2023). The primary and secondary knee OA are the two categories of the condition. The primary knee OA is the articular degeneration that has no discernible underlying cause (Hsu & Siwiec, 2023). The abnormality of articular cartilage or an abnormal force amount across the joint that with post-knee trauma can result in secondary knee OA (Hsu & Siwiec, 2023).

1.2.2. Young Adults

It is the last phase of adolescence, where young adults change from childhood or adolescence and enter into adulthood (Ayres & Hurst, 2023). The young adults can develop independence and self-exploration. Also, young adults can make their own decisions about their schooling, future employment, and their goals. Meanwhile, they will also begin to build a relationship with others (Ayres & Hurst, 2023).

1.2.3. Knee OA Prevention

It is a strategy to avoid an increase in the probability of knee OA development. It can be categorized into primary and secondary strategies. The primary strategy is the process of reducing risk factors and changing the physical activities or exposures that cause knee OA (Roos & Arden,

2016). The secondary strategy involves diagnosis and a curative process to prevent knee OA progression. (Roos & Arden, 2016).

1.3. RATIONALE OF STUDY

Knee OA is a serious disease that can cause disability and further impact the financial problems for the patients. Those who suffer from knee OA have difficulty performing normal activities of daily living and cause working impairment due to disability (Alyousef et al., 2023). Although knee OA is unable fully prevented, it can be also controlled and managed to decrease the likelihood of knee OA development. A study shows that improvement of knowledge of knee OA is the primary preventive tool for knee OA development (Ganasegeran et al., 2014). Thus, it is significant to prevent knee OA development as early as possible. However, there are insufficient shreds of evidence to prove the level of knowledge of knee OA in young adults and their attitude toward knee OA prevention. Also, there is a study by (Mukharrib et al., 2018) shows a pressing urge to improve the level of knowledge in young adults. This study aims to determine the young adults' knowledge of knee OA and their attitude toward knee OA prevention.

The result of this study contributes to the organizing of awareness campaigns, programs, or workshops by healthcare societies or physiotherapists according to the level of knee OA knowledge and attitude toward knee OA prevention in young adults. This study shows the level of knowledge and attitude of young adults towards knee OA to provide further

improvement in knee injury management of physiotherapy. Physiotherapists enhance the management of knee injury by including educational sessions and teaching young patients about the prevention and knowledge of knee OA. Besides, this study provides awareness for other researchers to further look into other prevention methods or interventions for knee OA.

1.4. SCOPE OF STUDY

This research focuses on young adults aged 17 to 28 years old who have the ability to read and comprehend English. Young adulthood is a crucial period for developing knee OA information, attitudes, and behaviours that can affect long-term health outcomes. This explained the reason that this age group was selected. By targeting this age group, the study aims to evaluate their level of knowledge about knee OA because it is a condition that may eventually affect their quality of life in the future, and to investigate their attitudes toward knee OA prevention. Understanding how young adults perceive and approach preventive measures is essential for designing effective education and intervention programs that encourage proactive behavior. This focus aligns with the study's overarching goal of identifying gaps in knowledge and attitudes within this age group, which can serve as a foundation for future strategies to promote joint health and reduce the long-term impact of knee osteoarthritis

1.5. PROBLEM STATEMENT

The impact of knee osteoarthritis (OA) including disabilities in daily activities (Foo et al., 2017) and worse will eventual cessation of employment (Sayre et al., 2010). Besides, knee OA may cause financial burdens to the

patient due to the high cost of medical expenses (Lo et al., 2021). Snoeker et al. (2020) study shows a higher risk of knee OA development in the future among young adults but the younger group has lower knowledge and awareness levels when compared with the elderly group in the study of Alghamdi et al. (2023). Thus, knee OA has caused significant problems for young adults but there is a gap in understanding the level of knowledge and attitude toward the prevention of knee OA among young adults. The existing studies highlight the important role of knowledge in knee OA and knee OA prevention (Ganasegeran et al., 2014; Mukharrib et al., 2018). However, there is a lack of scientific evidence about the knowledge of knee OA and the attitude of knee OA prevention among young adults. This study aims to evaluate the knowledge level of knee OA and attitude towards knee OA prevention to provide information for targeted educational campaigns and improve physiotherapy management of knee injuries. This study aims to obtain knowledge of knee OA and the attitude toward knee OA prevention among young adults. The purpose of this study is to fill this gap and aid in contributing to effective educational efforts and the initiation of knee OA prevention among young adults.

1.6. RESEARCH QUESTION

(a) What is the level of knowledge of knee osteoarthritis in young adults?

(b) What is the attitude of young adults toward the prevention of knee osteoarthritis?

1.7. OBJECTIVES

Primary Objectives

(a) To determine the level of knowledge of knee osteoarthritis in young adults.

(b) To determine the attitude of young adults towards knee osteoarthritis prevention.

Secondary Objectives

1. To determine the significant relationship between gender, race, educational levels, and family income levels; and knowledge level of knee osteoarthritis.
2. To determine the significant relationship between gender, race, educational levels, and family income levels; and knowledge level of knee osteoarthritis prevention.
3. To determine the significant relationship between knowledge level of knee osteoarthritis and attitudes toward knee osteoarthritis prevention.

1.8. HYPOTHESIS

1. There is no significant relationship between gender, race, educational levels, and family income levels; and knowledge level of knee osteoarthritis.
2. There is no significant relationship between gender, race, educational levels, and family income levels; and knowledge level of knee osteoarthritis prevention.
3. There is no significant relationship between knowledge level of knee osteoarthritis and attitudes toward knee osteoarthritis prevention.

CHAPTER 2

2.0 REVIEW OF LITERATURE

CHAPTER OVERVIEW

Knee OA has become a critical problem globally as the knee OA prevalence has gotten higher in recent years. This condition may cause challenges and burdens to the healthcare system. This chapter provide the understanding of the prevalence, knowledge, and attitude towards knee OA to reduce the population of knee OA in the future.

2.1 Prevalence and Consequences of Knee OA in Malaysia

Knee OA is a disorder of joint degeneration explained by the articular cartilage erose gradually which poses a significant health challenge globally and impacts millions of lives as well as causes a burden for healthcare systems. In Malaysia, the prevalence and impact of knee osteoarthritis have become increasingly apparent. As Malaysia undergoes rapid demographic and lifestyle changes the burden of musculoskeletal disorders, particularly knee osteoarthritis has emerged as a critical public health concern.

The study by Mat et al. (2019) shows the prevalence of knee OA symptoms is 25.4% of the population in Kuala Lumpur. There is an ethnic difference in knee OA symptoms with constant geographical area. In Malaysia, the population has a lack of awareness of knee OA symptoms and knee pain as the prevalence of 33.3% of knee pain and 30.8% of knee OA

symptoms of self-reported alternatively. Also, knee OA symptoms show a prevalence percentage among ethnic Malays with 44.6%, 31.9% of ethnic Indians, and 25.7% of ethnic Chinese. The findings contribute to our understanding of the complex interplay between ethnicity with specific lifestyle factors and musculoskeletal health among the population. This study indicates that the ethnic Malays with high risk of OA due to the practice of the 'floor culture' in their lifestyle. This is similar to Johar (2019) that knee OA development is due to a daily lifestyle that requires physical activities that involve many knee movements such as bending the knee. This shows that a rise of knowledge on knee OA prevention is required to allow a reduction in the risk of knee OA.

A study by Foo et al. (2017) shows that patients with knee OA in Malaysia have moderate functional disability in performing daily activities such as walking but it causes severe functional disability in running, jumping, twisting, squatting, and kneeling. These indicate that knee OA reduces the ability of patients with knee OA to perform activities of daily living. Thus, it is crucial to raise the level of knowledge of knee OA and knee OA prevention in young adults to prevent the early development of knee OA.

Azzeri (2021) claimed that orthopaedic surgery for knee arthroplasty also known as knee replacement surgery is the most expensive surgery procedure. The surgery is roughly USD7500 per patient per knee in Malaysia. Knee arthroplasty is considered an alternative way of managing chronic knee OA. The cost can be changed and further charged by inpatient services and

pharmacy services. This article also shows that there is an increase in chronic knee OA among young. The financial burden for knee OA will increase in both elderly and younger groups if the patient does not make an intervention for knee OA. Thus, it is recommended to enhance the knowledge of knee OA and awareness of knee OA prevention.

2.2.Risk Factors of knee OA

Knee OA becomes critical to understand the complex array of risk factors that will influence the condition's onset and progression. These risk variables are like threads woven together in a complicated way. It has provided an explanation that emphasizes how important it is to understand the impact of genetic, environmental, and lifestyle factors interplay proactively.

Runhaar & Bierma-Zeinstra (2022) study that the main risk factor that causes the development of knee OA is knee joint injury. This can be seen commonly among sports players who have a higher probability of exposure to joint trauma and meniscus injury. The examples of sports provided in this study are soccer ball, football, and gymnastics. These sports are also known as high-risk sports which can lead to trauma of anterior cruciate ligament (ACL) at the knee. The weakness of local muscles is also associated with knee OA development, and it is also an early symptom of knee OA. This study also claimed that lowering knee OA development by preventing knee traumas while avoiding obesity would cause a better decline in the total incidence of

knee OA. The risk factors of knee OA deserve to have our attention to prevent knee OA development.

Based on the study of Cui et al. (2020), the risk factors of knee OA can be either modifiable or unmodifiable. The modifiable risk factors can be body mass index (BMI) and knee trauma. This study shows that BMI is the main risk factor to cause knee OA formation. BMI may relate to the weight of the person and a higher BMI is more likely to obtain obesity. Besides, this study shows that the unmodifiable factors are age and gender. This study shows that the increase in knee OA prevalence is corresponding to an increase in age. The other risk factor is that females are more likely to obtain knee OA when compared to males. This demonstrates that raising awareness is crucial for the early prevention of the modifiable risk factors of knee OA.

In the study by Katz et al. (2021) knee OA noticeable symptoms have a higher risk among persons with obesity with greater BMI compared to persons without obesity. The percentage given is 19.7% and 10.9% respectively. This is similar to the study by Zamri et al. (2021) found there is a high risk of knee OA population in Malaysia as 62.6% of the patients are hypertension which correlates to the high prevalence of overweight as well as obesity problems and these will lead to a greater probability of OA development. Katz et al. (2021) indicate that overload on the knee will increase knee OA development risk. Bone exposure to heavy load will cause damage to bone marrow and remodeling. Besides, joint injury also brings up

the risk associated with knee OA incidence with a percentage of 12%. Hence, it is vital to reduce in obese population and pay more attention to overweight problems to early prevent the risk of knee OA.

A study among young adults by Snoeker et al. (2020) involved various knee injuries such as cruciate ligament injury, tear of the meniscus, and knee bone fractures such as patella. These factors will increase the risk of knee OA development. This study highlights a higher risk of knee OA development in the future among young adults. They may have several modifiable risk factors associated with knee OA. Thus, it is important to investigate the level of awareness and attitude of knee OA prevention in young adults.

2.3.Prevention of knee OA

The knee bears a lot of work to our daily living activities by giving support and mobility. Over time, several risks will gradually develop knee OA that affects all individuals worldwide. There are ways to prevent the impact of knee OA through proactive measures and lifestyle choices.

Zamri et al. (2021) studied that the majority of knee OA patients have improper diets and sit for long periods. These factors cause obesity and no movement of the knee for 10 hours per day will lead to chronic knee pain and will further develop knee OA. This study claimed that the increase in

knee OA risk is corresponding to body weight gain. This study also shows that weight loss programs can be considered as prevention for knee OA for obese people to treat knee OA.

Another study by Whittaker et al. (2021) shows that being overweight will increase knee OA risk and it is significant to prevent overweight incidents. The overweight person is more likely to approach with knee pain due to changes in knee structures. This study claims that a reduction of body weight by around 5 kg or 5% will decrease knee OA incidence rate effectively. It is essential for an urge to increase the knowledge of weight control to prevent knee OA. This study includes the prevention of knee injury by enhancing the knowledge of knee OA for sports fields. Sports participation shows a higher risk of knee injury which is the major risk factor of knee OA. Therefore, it is significant for any sports player or athlete to prevent knee injury. Besides, exercises can prevent knee OA by controlling body weight and providing better muscle control as well as increasing the functional capacity of the knee joint. These may prevent the risk of knee OA by protecting and maximizing knee function.

Zeng et al. (2021) provide information that aerobic exercises increase the effect of cartilage stimulation and boost the repairment of damaged cartilage. This can prevent the risk of knee OA as cartilage can provide flexibility and resist overload forces. Aerobic exercise has several health benefits, such as enhancing muscular strength, increasing the healing rate of injured cartilage,

and reducing discomfort. The therapeutic benefits of aerobic exercise vary depending on its intensity. Excessive aerobic exercise may cause severe knee injury and it is important to control the intensity of aerobic exercise.

Another study by (Ratzlaff & Liang, 2010) suggest that non-operative treatments, such as physical exercises, may lead to a lower prevalence of osteoarthritis when compared to surgical interventions. This treatment will provide effectiveness, especially in participants who are willing to change their daily activity levels. The study highlights that a decline in muscle performance and reduced neuromuscular function in the lower extremities can increase the risk of osteoarthritis in young and middle-aged adults. This is because physical exercise can enhance cartilage integrity, potentially preventing the development of osteoarthritis. However, there is a lack of research to conclusively support the idea that exercise can prevent knee OA following knee injuries.

From the above studies, it can be seen there are several ways where knee OA can be prevented. Thus, it is vital to find out the level of knowledge of knee OA and attitude towards the prevention of knee OA in young adults to facilitate the actual prevention of knee OA.

2.4.Knowledge of knee OA

The impacts of knee OA has made people's life struggling with pain and many problems with social. Patients with knee OA are difficult and afraid to perform simple activities like walking due to pain. The enhancement of

knowledge and awareness of knee OA must be significant not only to highlight the prevalence of knee OA but also to educate and empower the community as well as healthcare professionals.

A study by Wu et al. (2024) about the knowledge, attitude, and practice of patients with knee OA towards osteoporosis and its prevention. The study states that the patient with a higher knowledge level will practice the prevention measure more effectively due to the patient having more knowledge about the condition and health benefits. In general, the effectiveness of prevention measures of knee osteoarthritis relies on the person's knowledge level of knee osteoarthritis.

Alghamdi et al. (2023) Studied that the younger group has low levels of knowledge about OA when compared to the elder groups. This study concluded that the majority of 1638 participants have low levels of knowledge of OA. Thus, there are a total of 64.2% of the participants lack knee OA awareness and knowledge. This study shows that most of the young people has low OA knowledge level and this require further study to provide intervention which targeting young people.

In Malaysia, a study conducted by Ganasegeran et al. (2014) had an outcome of 53.6% of middle adulthood participants having poor knowledge of knee OA. The knowledge of quadriceps muscle strengthening exercises

that can avoid knee OA development is not well understood in this population. This study also highlights that female subject has insufficient knowledge of knee OA when compared with male subjects. It is significant for the spread of knee OA knowledge to raise awareness for possible earlier knee OA prevention processes.

Al-Khlaifat et al. (2020) have reported inadequate knowledge of knee OA due to faulty communication with healthcare professionals. They also show that middle-aged adults have an insufficient level of knowledge of body function alteration due to knee OA such as muscle weakness. Besides, the subjects were not aware of self-help management to relieve knee OA symptoms. The middle-aged adults referred to a lack of education from the healthcare professionals and inappropriate services provided. Therefore, the knowledge of knee OA should be early known and aware by people.

Another study by Gulzar et al. (2023) shows the knowledge and awareness level towards knee OA with 35.5 % of 369 middle-aged adults. There were only 14.9% of the participants aware of the knee injury that will lead to knee OA, 30.0 % participants know that obesity is the risk factor and 2.17% know that knee OA is due to family history. The lack of awareness of knee OA among middle-aged adults will lead to a low level of knee OA knowledge. This study highlights that more knowledge and early information for middle-aged adults will lead to early diagnosis and provide effective

treatment. It is important to increase the awareness and knowledge in younger groups about knee OA

2.5.Attitude and Prevention Methods

A study by Nissen et al. (2022) with several medical professionals believe that osteoarthritis (OA) is a "wear-and-tear" condition with predictable symptom development, and it necessitates joint replacement surgery in the long run. Besides, the attitudes and beliefs of clinicians regarding physical activity and exercise therapy as a treatment for patients with knee OA have a lack of interest and knowledge about it. Thus, it is necessary to implement a better attitude among clinicians or patients to improve the motivation for knee OA prevention.

Another study by Jeihooni et al. (2021) about educational intervention in the prevention measure of knee osteoarthritis in the experimental group has improved the attitude towards knee osteoarthritis prevention behaviour compared to the control group. The population included in this study are women over 40 years old, the vital age group that requires immediate improvement of preventive behaviour of knee osteoarthritis due to its high-risk age group. This study shows that the attitude of participants in the experimental group toward knee osteoarthritis prevention has better preventive behaviour due to the theory of planned behaviour. Thus, this indicates that a better attitude towards knee osteoarthritis prevention

measures will increase the preventive behaviour and practices that aim to reduce the morbidity of knee osteoarthritis.

In the study by Ekram et al. (2016) shows a greater effort to lose body weight among obese and overweight participants due to their better belief and attitude towards physical activity that helps to prevent weight gain when compared with normal-weight participants. Another reason behind this is that obese participants were more likely to believe that weight gain is because of body metabolism rate and genetic factors when they are compared to normal-weight participants. This may indicate that people with better knowledge and a good attitude towards a prevention method may increase effort and motivation towards the preventive method.

A study by Jormand et al. (2022) an involved educational intervention to enhance self-care management behaviour which includes elderly participants who have knee OA. After receiving the education intervention, the results show significant improvements regarding attitude, subjective norms, and behaviours in the experimental groups whereas the control groups do not have any improvements in this study. The findings in this study show the effectiveness of educational intervention has significant improvement in the attitude and knowledge of the elderly with knee OA. It is suggested to implant educational intervention in the younger groups which can help to have early knowledge on knee OA to enhance the effectiveness of knee OA prevention.

CHAPTER 3

3.0 METHODOLOGY

CHAPTER OVERVIEW

The study's methodology is described in detail in this chapter. Along with the sample size, sampling technique, and inclusion and exclusion criteria for participants, it also discusses the study's design, setting, and population. The chapter describes the data collection procedure, and the instruments used to gauge knowledge of knee osteoarthritis (OA) and attitude toward knee OA prevention. Ethical considerations are discussed to guarantee adherence to research ethics, and the Data Analysis Method is explained to make the statistical approach clear. This chapter offers a clear structure for carrying out the investigation.

3.1. STUDY DESIGN

Cross-sectional study designed to determine the knowledge of knee OA in young adults and the attitude of knee OA prevention in young adults. The prevalence of certain specific characteristics or problems within a population at the point in time can be evaluated with the help of cross-sectional studies(Singh, 2023). This can be beneficial for public health studies to pinpoint health problems that might need to be addressed right away.

3.2. STUDY SETTING

The study reached respondents in Selangor by promoting questionnaires with invitation messages on social media applications, such as WhatsApp, WeChat, Instagram, and Facebook or request directly to the participants physically. The self-introduction, topic of research, purpose of research, inclusion criteria, hyperlink, QR code, and informed consent has been provided for the recruited respondents.

3.3. STUDY POPULATION

The population selected in this study are the young adults from Selangor aged from 17 to 28 years old who are independent and able to make their own decisions (Ayres & Hurst, 2023). According to Levinson's Theory, the phase of early adulthood and the phase of entering adulthood fall between 17 to 28 years old (Aktu & İlhan, 2017). The population is not restricted by gender, occupation, ethnicity, or religion.

3.4. SAMPLE SIZE

According to ZhujiWorld.com (n.d.), the population aged from 15 to 29 in Selangor is 1,400,125 people. Sample size calculation was calculated with the use of the 'Population Proportion – Sample Size' calculator (Select Statistical Services, n.d.). The formula used in the calculator is: $n = \frac{N*X}{(X+N-1)}$, where $X = \frac{Z_{\propto/2}{}^2 * p * (1-p)}{MOE^2}$. $Z_{\propto/2}$ is the normal distribution value, margin of

error (MOE) and p indicate the proportion of the sample. The sample size of 380 is obtained with a confidence level of 95%, a 5% margin of error, and a 50% sample proportion. A total of 423 sample size is obtained after added with 10% of the sample size in case of several participants are excluded or data collected is incomplete.

3.5. SAMPLING METHOD

The sampling method used in this study is a non-probability sampling technique by convenience sampling method due to the time constraint and study setting. The convenience sampling method can access respondents with less time-consuming, inexpensive, and fast data collection (Fleetwood, 2023).

3.6. INCLUSION CRITERIA

(a) Participants aged 17 to 28 years old (Ayres & Hurst, 2023).

(b) Participants who are female and male.

(c) Malaysians of all races and backgrounds.

(d) Participants who do and do not experienced knee pain.

3.7. EXCLUSION CRITERIA

(a) Participants who are unable to read and understand English.

(b) Participants with cognitive or neurological problems.

3.8. INSTRUMENTS

3.8.1. Knowledge level of knee osteoarthritis

The Osteoarthritis Knowledge Scale (OAKS) is a measurement tool for assessing knowledge about osteoarthritis, especially hip and knee OA (Darlow et al.,2023). It was created to assess critical OA knowledge areas such as cause, diagnosis, symptom interpretation, management concepts, therapy, and self-care choices. A total of 11 questions were included in the questionnaire and it is intended to assess participants' knowledge of knee OA (**APPENDIX B**). Each question was provided with a Likert scale scored from 1 to 5. The questions are included with reverse score items and the higher score in OAKS indicates higher knowledge about knee OA. The OAKS can be used by physicians to discover possibilities for knowledge development or to focus on educational treatments effectively (Darlow et al.,2023). The OAKS knee version has been used in 3 studies that assess the knowledge level of knee OA after an educational intervention, the studies included are (Darlow et al., 2022), Egerton et al. (2022), and Lawford et al. (2023).

To assess test-retest reliability, the researchers obtained the standard error of measurement (SEM) and smallest detectable change (SDC) for the OAKS (Darlow et al.,2023). The OAKS knee version displayed a high score in test-retest reliability (Darlow et al.,2023). OAKS knee version is a construct with validity due to it being used in three clinical studies to measure knowledge change after an educational intervention (Darlow et al.,2023). These trials

found that groups getting intervention information improved their knee OAKS scores more than those receiving control information. The permission has been granted from the authors through email and the OAKS knee version can be used in the questionnaire.

3.8.2. Knowledge level of knee osteoarthritis prevention

The purpose of this questionnaire is to assess the basic knowledge and information about knee OA prevention of the participants. This questionnaire has provided with a total of 5 correct prevention methods and 5 random incorrect prevention methods (**APPENDIX C**). The correct method of knee OA prevention is according to the study by Whittaker et al. (2021) about preventing the risk factor of knee OA. The participants are required to select the correct knee OA prevention method. Item numbers 3, 4, 6, 8, and 10 are the correct knee OA prevention method whereas item numbers 1, 2, 5, 7, and 9 are the incorrect knee OA prevention method. The participants will obtain 1 point for each correct methods and be left blank for the incorrect method. However, participants will obtain 0 points for incorrect filling up. Overall maximum score for this questionnaire is 10 points if all questions are answered correctly. The higher the total score obtained, the higher the knowledge level of knee OA prevention methods. Three experts will review and validate the questionnaire before the questions are promoted to participants. After the review by the experts, the questionnaire has been edited based on the comments of the experts to achieve the face and content validity of the questionnaire to prevent irrelevant questions.

3.8.3. Attitude toward knee osteoarthritis prevention

The participants has been asked about the knee OA prevention questions to assess their attitudes toward the prevention of knee OA. The questions are modified and based on the study of Odeyemi et al. (2022), Bukata et al. (2022) and Kundu et al. (2023). The participants were assessed using 9 questions and given a Likert scale selection (**APPENDIX D**). The questions will focus on the participants' thoughts and their motivation about knee OA prevention by asking "Do you think it is important to take preventive measures against knee osteoarthritis?" and "To what extent are you motivated to engage in activities that can help prevent knee osteoarthritis?". The questions also involve focusing on the belief in the effectiveness of knee OA prevention by asking "How effective do you think prevention measures for knee osteoarthritis will be?". The questions include attitudes towards knee OA prevention by asking "How important is it to avoid high-impact sports (e.g. basketball, football, etc.) to maintain knee health?" and "How important it is to maintain an ideal body mass index (BMI) in preventing knee osteoarthritis?". The questions end with the self-assessment of the knee OA development in the future by asking "How likely do you think you will get knee osteoarthritis in the future?" and "How likely do you think your older family members will get knee osteoarthritis in the future?". The attitude questionnaire has been reviewed and validated by three experts before the questions are promoted to participants. After the review by the experts, the attitude questionnaire was edited based on the comments of the experts to achieve the face and content validity of the questionnaire to prevent irrelevant questions.

3.9. PROCEDURE

The questions of the knee Osteoarthritis Knowledge Scale (OAKS) and questions about knee OA knowledge level as well as attitudes toward knee OA prevention has been compiled into Google Forms. Then, the questionnaires have been submitted to the Scientific and Ethical Review Committee (SERC) of Universiti Tunku Abdul Rahman for critical review and has obtained approval form. Next, the invitation post has been sent out to participants with a self-introduction, the topic of the study, the purpose of the study, inclusion criteria, hyperlinks, and a QR code. The interested participants are required to provide an acceptance to the Personal Data Protection Statement and the informed consent form. After these, the participants will continue with the demographic data (**APPENDIX A**) to collect participants' age, gender, race, living area, educational level, total family income, knee pain experience, and reasons for knee pain. The participants were given a limited time frame to ask about their knee pain experience. The time limit for the past 6 months is due to it being considered as chronic pain if the pain has passed 6 months. Besides, chronic pain will affect activities of daily living and cognitive function (Moriarty et al., 2011).

The participants will continue with the next section, discussing knowledge of knee OA, knowledge of knee OA prevention, and attitudes toward knee OA prevention. The questions are in English and consist of Part A, Part B, and Part C. Part A consists of 11 questions from knee OAKS about the knowledge of knee OA, prevention of knee OA, and treatment of knee OA. Part B will assess participants' knowledge about knee OA prevention with a total of 5 correct prevention methods and 5 random incorrect

prevention methods. Part C has a total of 9 questions about attitudes toward knee OA prevention to indicate the thoughts and attitudes of the participants toward knee OA prevention. The data collection processed by using social media apps or request participants physically. After reaching the target number of participants, the data analysis has been processed with SPSS using descriptive anaysis to calculate the mean (M), median, standard deviation (SD), and to test for association as well as generate tables, graphs and charts to simplify the data for data interpretation.

3.10. DATA ANALYSIS METHOD

The data collected has been tabulated, and a pie chart has been formed using Microsoft Excel and SPSS. The IBM Statistical Package for the Social Sciences (SPSS) with version 29.0 software was used to process data analysis. The demographic data, such as gender, age, race, state, educational level, and family income level has been analyzed using frequency (n) and percentage (%). The data of knowledge level scores has been analyzed in the form of mean (M) values and standard deviation (SD). The responses of the participants for instruments A, B, and C have been summarized into a frequency table with frequency (n), and percentage (%) for each item. The scoring of instruments A and B have been analyzed by forming mean (M) values and standard deviation (SD) according to the scoring obtained by the participants and arranged from highest to lowest scoring. The Mann-Whitney U test was used to identify differences between gender and scoring of instruments A and B. The Kruskall-Wallis H test was used to determine the differences between race, educational level, and family income level with the

scoring of instruments A and B. The relationship between instruments B and C was determined by using the Kruskall-Wallis H test to compare scoring from instrument B with attitude levels in instrument C.

3.11. ETHICAL CONSIDERATION

This proposal has obtained the ethical approval sheet from the Scientific and Ethical Review Committee (SERC) of Universiti Tunku Abdul Rahman (UTAR). The participants have been provided with a Personal Data Protection Statement clarify the consent form and give an electronic signature to proceed with the questionnaire. This ensures that permission is acquired from the participants to provide their information, and the participants are informed of the process for their personal information. The informed consent was provided for the participants. The participants have been informed about the purpose, risks, benefits, and procedure of this study. The participants also have been informed that withdrawal from this study is allowed, and their actions or involvement is voluntary.

CHAPTER 4

4.0 RESULT

CHAPTER OVERVIEW

This chapter contains the results and findings of data collection of this research project. From the beginning, the demographic information of the participants will be presented with tables and figures of the overall findings. Then will be followed by a session about the knowledge level of knee osteoarthritis, knowledge level of knee osteoarthritis prevention, and attitude toward knee osteoarthritis prevention among participants respectively.

4.1. SOCIODEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

4.1.1. Age group and Gender

A total number of 380 participants excluding 3 participants who disagree with the Personal Data Protection Notice (**APPENDIX F**). In this study involved 204 females (53.7%) and 176 males (46.3%). The number of participants will be further classified according to different age groups and respective genders on a clustered bar chart with a confidence level of 95%. Figure 6.1 shows that female participants generally are more involved than male participants in each age group. The majority of female and male participants are all clustered in the 21-24 age group with 147 females and 127 males shown in Figure 6.1. The 17-20 age group contains 50 females and 34 males whereas the 25-28 age group contains 7

females and 15 males. The 25-28 age group will have the lowest and minor numbers of participants in this study.

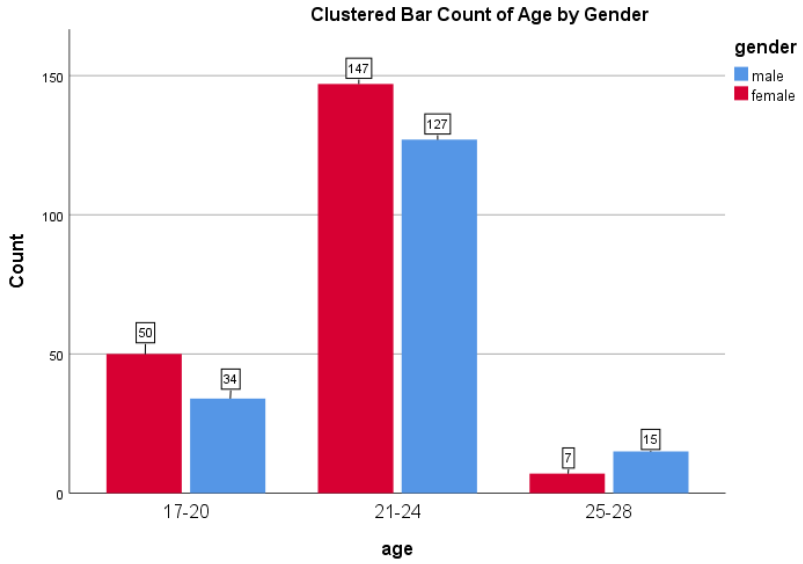

Figure 4.1: Age group and gender with frequency count (n) and a confidence level (Cl) of 95%.

4.1.2. Race

A total participant of 380 with different races were collected and formed into a pie chart. Figure 6.2 shows the race distribution of participants with 63.95% Chinese, 26.05% Malay, and 10.00% Indian. Generally, the participants involved in this study majority are Chinese, followed by Malay and the minor group is Indian participants.

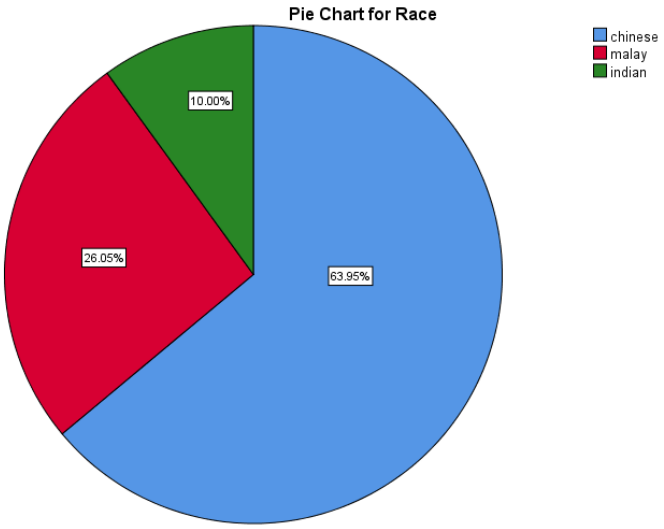

Figure 4.2: Race with percentage (%).

4.1.3. State

Figure 6.3 shows the total number of participants included are 380, and categories according to the different states of their hometowns. The majority of the participants are from Selangor state with a percentage of 61.58% and the second highest percentage of participants involved are from Penang with a percentage of 13.68%.

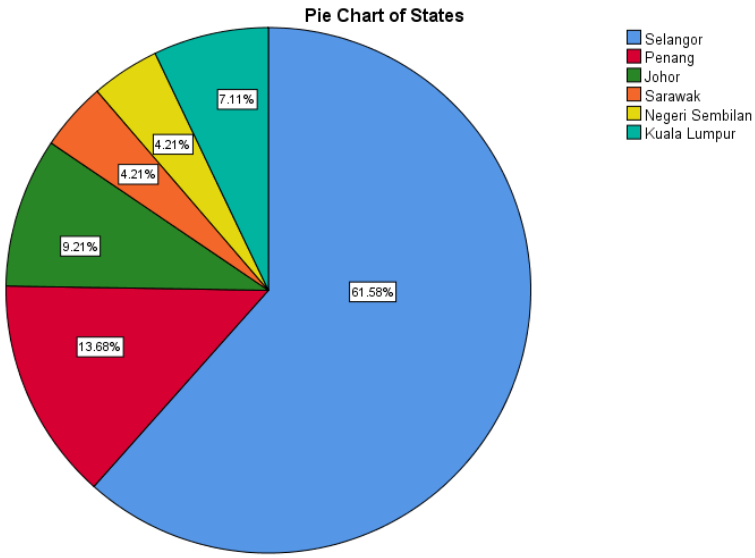

Figure 4.3: States with percentage (%)

4.1.4. Educational level

The total number of participants of 380 with distinct highest educational levels obtained. Figure 6.4 shows the majority of participants involved have a tertiary education level with the percentage of 77.11% as their highest educational level. It is then followed by the secondary educational level with a percentage of 22.37% of participants. The lowest percentage of highest educational level participants obtained is the primary educational level with 0.53%.

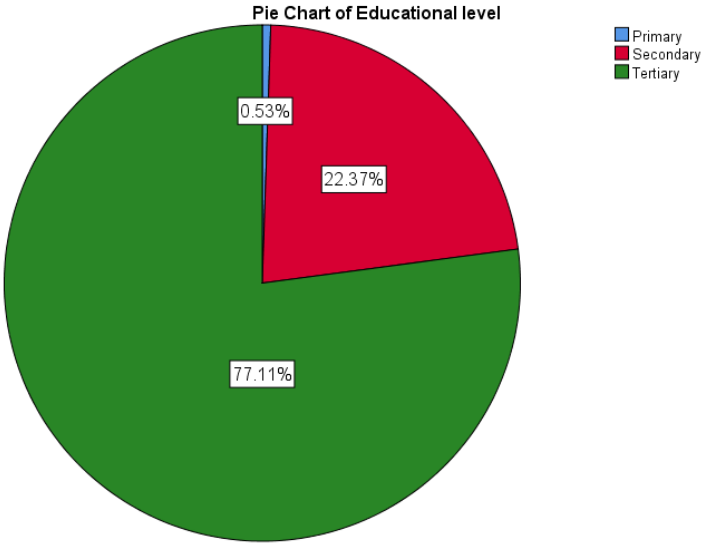

Figure 4.4: Educational level with percentage (%)

4.1.5. Family income level

Figure 6.5 shows the total family income level of each participant (n=380) included in this study. The highest percentage of 35.26% of participants are with RM2,000 – RM4,999 family income level, then followed by a family income level less than RM2,000 with a percentage of 23.42%, and continued with a percentage of 21.05% of family income level RM5,000 – RM9,999. It shows

that most of the participants involved have total family income levels that are less than RM10,000, and the majority among these participants are clustered at the group of family income level of RM2,000 – RM4,999.

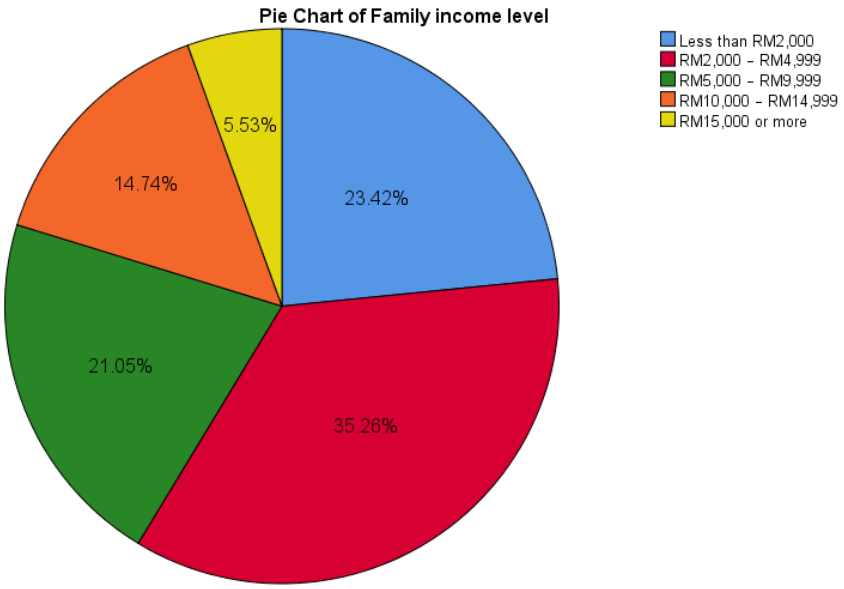

Figure 4.5: Family income level with percentage (%)

4.1.6. Experienced knee pain in the past 6 months and the reasons for knee pain

Figure 6.6 shows the percentage of participants with experienced knee pain in the past 6 months with a total participant of 380. The majority of participants involved do not experience knee pain in the past 6 months with 57.9% of "No" responses. The participants who experienced knee pain in the past 6 months have the second highest percentage of 35.8% of "Yes" responses. A minority of participants responded to the confusion of knee pain experience in the past 6 months with 6.3% of "I am not sure" responses.

Figure 6.7 shows the reasons for participants who have experienced knee pain and participants who were not sure of the experienced knee pain. The "exercise relatewere d" is the reason that the majority of the participants selected with 58 responses (36.3%) and then followed because of "sports injury" with 45 responses (28.8%) and "overuse during work" with 35 responses (21.9%).

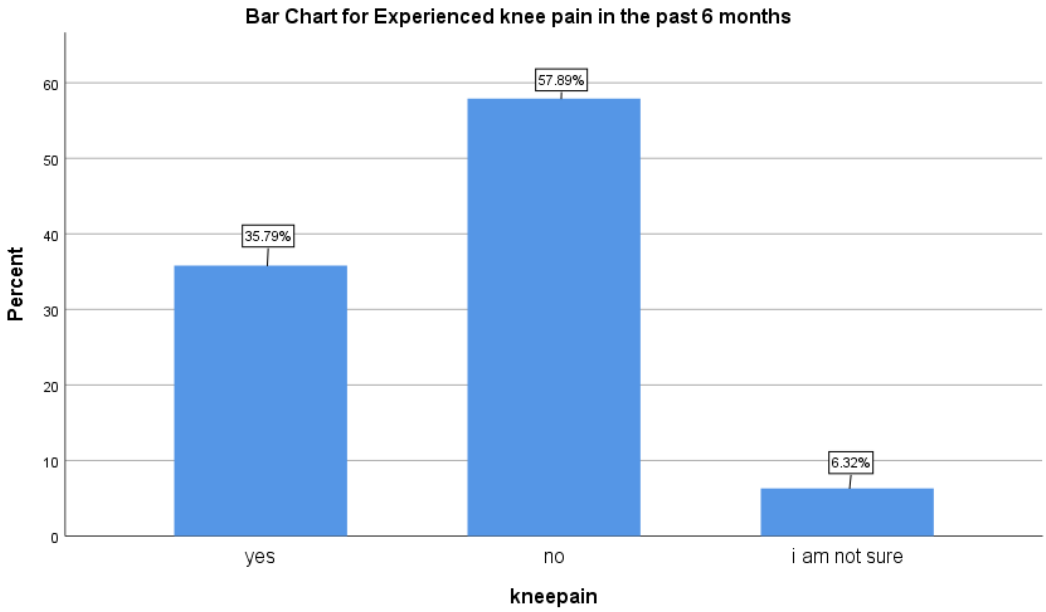

Figure 4.6: Experienced knee pain in the past 6 months with percentage (%)

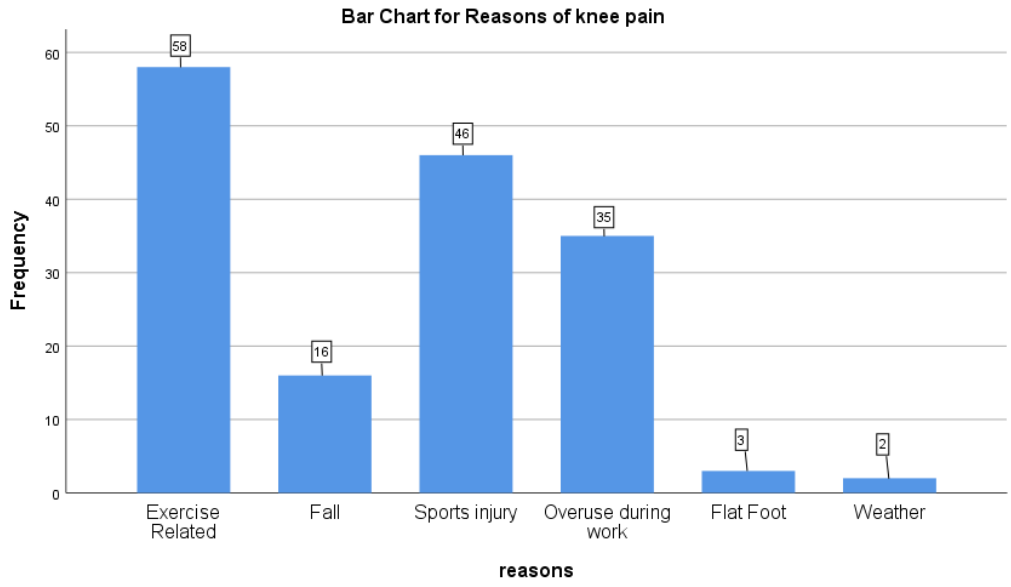

Figure 4.7: Reasons of knee pain in the past 6 months with frequency count (n)

4.1.7. Summary of all demographic data

Table 6.1 shows a summary of demographic data for total participants of n=380. The frequency (N) and percentage (%) of each data include age group, gender, race, state, educational level, family income level, experienced knee pain in the past 6 months, and reason for knee pain.

Characteristic	**n**	**%**
Age group		
17-20	84	22.1
21-24	274	72.1
25-28	22	5.8
Gender		
Female	204	53.7
Male	176	46.3
Race		
Chinese	243	63.9
Indian	38	10.0
Malay	99	26.1
State		
Johor	35	9.2
Kuala Lumpur	27	7.1
Negeri Sembilan	16	4.2
Penang	52	13.7
Sarawak	16	4.2
Selangor	234	61.6

Educational level		
Primary	2	0.5
Secondary	85	22.4
Tertiary	293	77.1
Family income level		
Less than RM2,000	89	23.4
RM2,000 – RM4,999	134	35.3
RM5,000 – RM9,999	80	21.1
RM10,000 – RM14,999	56	14.7
RM15,000 or more	21	5.5
Experienced knee pain in the past 6 months		
Yes	136	35.8
No	220	57.9
I am not sure	24	6.3
Reason for knee pain		
Exercise-related	58	36.3
Fall	16	10.0
	46	28.8
Sports injury	35	21.9
	3	1.9
Overuse during work	2	1.3
Flat foot		
Weather		

Table 4.1: Demographic characteristics of participants (n=380)

4.2. KNOWLEDGE LEVEL OF KNEE OSTEOARTHRITIS AMONG PARTICIPANTS

The level of knowledge of knee osteoarthritis among participants is measured by using the knee osteoarthritis knowledge scale (knee OAKS) with a total score for the scale ranging from 11 to 55, which concludes that a higher score obtained indicates a higher knowledge level of knee osteoarthritis. In this study, the scores obtained ranged from a minimum of 11 to a maximum of 47 scores. The mode was score 22 with 41 (10.8%) participants scoring this score. The median in this study was a score of 26 with 8 (2.11%) participants obtaining this score. Among the total participants of n=380, the mean score for knee OAKS is 26.78 with a standard deviation (SD) of 7.82.

Table 6.2 exhibits the frequency of each individual item from knee OAKS. In this study, the knowledge level (knee OAKS) score was divided into three categories; scores 11-25 were categorised as low knowledge level, scores 26-40 were categorised as medium knowledge level, and scores 41-55 were categorised as high knowledge level. 44.2% of participants have a medium level of knowledge and 50.0% have a low level of knowledge. Table 6.3 shows the summary of the knowledge level and score of participants.

		Number of participants				
Items	**Correct Answer**	**False (%)**	**Possibly False (%)**	**Unsure (%)**	**Possibly True (%)**	**True (%)**
These statements are about knee joint osteoarthritis.						
1. Your knee joint wears out with everyday use	False	38 (10.0)	64 (16.8)	46 (12.1)	160 (42.1)	72 (18.9)
2. Osteoarthritis will only get worse over time	False	16 (4.2)	28 (7.4)	43 (11.3)	110 (28.9)	183 (48.2)
3. Increased knee pain always means that you have damaged your knee	False	13 (3.4)	63 (16.6)	34 (8.9)	139 (36.6)	131 (34.5)
These statements are about what you should do if you have knee osteoarthritis.						
4. You need an X-ray or scan to know if you have osteoarthritis	False	15 (3.9)	39 (10.3)	44 (11.6)	109 (28.7)	173 (45.5)
5. Being active makes	True	102 (26.8)	76 (20.0)	67 (17.6)	92 (24.2)	43 (11.3)

osteoarthritis feel better						
6. Keeping a healthy body weight is a key part of osteoarthritis care	True	163 (42.9)	56 (14.7)	35 (9.2)	42 (11.1)	84 (22.1)
These statements are about treatment for knee osteoarthritis.						
7. X-rays or scans show how much your osteoarthritis affects you	False	5 (1.3)	24 (6.3)	38 (10.0)	143 (37.6)	170 (44.7)
8. Making your leg muscles stronger improves your ability to do daily tasks	True	150 (39.5)	41 (10.8)	27 (7.1)	105 (27.6)	57 (15.0)
9. Pain from osteoarthritis can be managed without surgery	True	76 (20.0)	70 (18.4)	49 (12.9)	123 (32.4)	62 (16.3)
10. Exercise can ease pain as much as most medications	True	82 (21.6)	120 (31.6)	42 (11.1)	61 (16.1)	75 (19.7)

11. Most people with knee osteoarthritis will need a joint replacement at some point	False	26 (6.8)	60 (15.8)	74 (19.5)	134 (35.3)	86 (22.6)

Table 4.2: Frequency table of Knee OAKS responses in frequency (n) and percentage (%).

Description	**Number of participants (%)**
Lowest score: 11 **Highest score: 47**	Lowest score: 2 (0.53) Highest score: 1 (0.27)
Mode (score 22)	41 (10.8)
Median (score 26)	8 (2.1)
Mean (SD)	26.78 (7.82)
Knowledge Level Categories **- Low Knowledge** (score 11-25) **- Medium Knowledge** (score 26-40) **- High Knowledge** (score 41-55)	 190 (50.0) 168 (44.2) 22 (5.8)

Table 4.3: Summary of knowledge level and scores of participants

The Mann-Whitney U test was conducted to determine if there were differences in knee OA knowledge level (knee OAKS) scores between males and females. Table 6.4 showed a significant difference in the distributions of knee OAKS scores between the two groups ($Z = -2.630$, $p = 0.008$). Males had a higher mean rank (206.44) compared to females (176.75), indicating that males tended to have higher scores on knee OAKS. This suggests that gender has a significant impact on the knowledge level of knee osteoarthritis.

The Kruskal-Wallis H test was used to determine differences in knee OA knowledge level (knee OAKS) scores between Chinese, Malays, and Indians. The results showed no significant difference in the knee OAKS scores among these three groups ($p = 0.175$). The mean rank of Chinese was 186.18, Malays was 207.24 and Indians was 174.53 shown in Table 6.4. This indicates that race does not significantly impact knee osteoarthritis knowledge level.

Table 6.4. shows the Kruskal-Wallis H test was used to determine differences in knee OA knowledge level (knee OAKS) scores between different educational levels; primary, secondary, and tertiary. The results showed no significant difference in the knee OAKS scores when compared with three distinct educational levels ($p = 0.176$). The mean rank obtained for each educational level is different; primary educational level (59.00), secondary educational level (183.16), and tertiary educational level (193.53). This shows that educational level does not have a significant impact on knee osteoarthritis knowledge level.

The Kruskal-Wallis H test was used to determine the differences between knee OA knowledge level (knee OAKS) scores between different income levels shown in Table 6.4. The results exhibit no significant difference in the knee OAKS scores with different income levels ($p = 0.966$). The mean rank obtained for different family income levels are family income less than RM2,000 (194.49); RM2,000 to RM4,999 (187.15); RM5,000 to RM9,999 (195.48); RM10,000 to RM14,999 (188.54); RM15,000 or more (181.21). This indicates that family income level does not significantly impact the knowledge level of knee osteoarthritis.

Factor	**Test**	**p-value**
Gender	Mann-Whitney U test	0.008 (<0.05)
Race	Kruskal-Wallis H test	0.175 (>0.05)
Educational Level	Kruskal-Wallis H test	0.176 (>0.05)
Family income level	Kruskal-Wallis H test	0.966 (>0.05)

Table 4.4: Summary table for test used to compare knee OAKS scores with four factors and significant difference for each factor.

4.3. KNOWLEDGE LEVEL OF KNEE OSTEOARTHRITIS PREVENTION AMONG PARTICIPANTS

The level of knowledge of knee osteoarthritis prevention among participants is measured by using a validated questionnaire with a higher score indicating a higher knowledge level of knee osteoarthritis prevention. The scoring obtained from the findings ranges from 1 to 9 scores. The mode and median were score 6 with 103 (27.11%) participants scoring this score. Among the total participants of n=380, the mean score for the knee OA prevention knowledge level is 5.15 with a standard deviation (SD) of 1.74.

Table 6.5 shows the individual items that have been selected by the participants. The knee OA prevention knowledge level was divided into three categories; scores 1-5 were categorised as low knowledge level, scores 6-7 were categorised as medium knowledge level, and scores 8-10 were categorised as high knowledge level. 46.1% of participants have a medium knowledge level of knee OA prevention and 49.0% have a low knowledge level of knee OA prevention. Table 6.6 exhibits the summary of knowledge levels and scores of participants.

Items	Correct Answer	Tick n (%)
1. Having a healthier diet		277 (72.9)
2. Long periods of rest		160 (42.2)
3. Avoid high-impact sports (e.g. basketball, football, etc.)	/	178 (46.9)
4. Avoid occupations requiring high physical loads (e.g. construction workers, repair workers, etc.)	/	238 (62.7)
5. Consider consuming more hot or warm water		155 (40.8)
6. Maintain good body mass index (BMI)	/	167 (44.0)
7. Regularly providing a hot pack around the knee joint		147 (38.7)
8. Avoid knee joint trauma (e.g. anterior cruciate ligament (ACL) tear, meniscal tears, intra-articular fractures of knee, etc.)	/	174 (45.8)
9. Regularly massage around the knee joint		153 (40.3)
10. Exercise and strengthen the muscle around the knee joint (e.g., quadriceps, hamstrings, etc.)	/	192 (50.6)

Table 4.5: Frequency table of knowledge level of knee OA prevention responses in frequency (n) and percentage (%).

Description	**Number of participants (%)**
Lowest score: 1 **Highest score: 9**	Lowest score: 6 (1.58) Highest score: 5 (1.32)
Mode (score 6)	103 (27.1)
Median (score 6)	103 (27.1)
Mean (SD)	5.15 (1.74)
Knowledge Level Categories **- Low Knowledge** (score 1-5) **- Medium Knowledge** (score 6-7) **- High Knowledge** (score 8-10)	 186 (49.0) 175 (46.1) 19 (5.0)

Table 4.6: Summary of knowledge level and scores of participants

The Mann-Whitney U test was conducted to compare the distribution of knee OA prevention knowledge levels between male and female participants. Table 6.7 shows the mean rank for males (194.03) and females (187.45). The results of the Z-value (-0.593) and p-value (0.553) which is greater than the significance threshold (0.05), indicate that there is no statistically significant impact on the distribution of knee OA prevention knowledge levels between genders.

The Kruskal-Wallis H test was conducted to compare the differences in knee OA prevention knowledge levels across three racial groups: Chinese, Malay, and Indian. Table 6.7 exhibits the mean rank for Chinese (189.44), Malays (192.53), and Indians (191.96). The test shows results of the p-value (0.968) are much greater than the conventional significance level of 0.05. This indicates that there is no significant difference in the distribution of knee OA prevention knowledge levels among the three racial groups.

The Kruskal-Wallis H test was conducted to determine differences in knee OA prevention knowledge levels among three educational levels: primary, secondary, and tertiary. Table 6.7 shows different mean ranks in each educational level which are primary (136.00), secondary (172.86), and tertiary (195.99). The obtained p-value (0.170) shows a greater value than the typical significant level of 0.05. This concludes that there is no significant distribution between knee OA prevention knowledge levels among the three different educational levels.

The Kruskal-Wallis H test was also used to compare differences between knee OA prevention knowledge levels and three different family income levels. The mean rank for each family income level is shown in Table 6.7. Family income level less than RM2,000 (196.13); RM2,000 to RM4,999 (190.06); RM5,000 to RM9,999 (169.33); RM10,000 to RM14,999 (213.56); RM15,000 or more (188.62). The p-value (0.207) shows a greater value than the conventional 0.05 significant level. This indicates that there is no significant distribution between knee OA prevention knowledge levels among the five different family income levels.

Factor	**Test**	**p-value**
Gender	Mann-Whitney U test	0.553 (>0.05)
Race	Kruskal-Wallis H test	0.968 (>0.05)
Educational Level	Kruskal-Wallis H test	0.170 (>0.05)
Family income level	Kruskal-Wallis H test	0.207 (>0.05)

Table 4.7: Summary table for test used to compare knee OA prevention knowledge levels with four factors and significant differences for each factor.

4.4. ATTITUDE TOWARD KNEE OSTEOARTHRITIS PREVENTION AMONG PARTICIPANTS

Regarding the attitude toward knee osteoarthritis prevention among participants, below is the frequency table shown in Table 6.8 of the selection of participants for each item. Figure 6.8 shows the ways that participants prefer to use to learn about the prevention methods of knee osteoarthritis.

Item	**Extremely Important n (%)**	**Very Important n (%)**	**Moderately Important n (%)**	**Slightly Important n (%)**	**Not Important n (%)**
1. Do you think it is important to take preventive measures against knee osteoarthritis?	110 (29.0)	148 (39.0)	100 (26.4)	19 (5.0)	3 (0.8)
	Extremely Motivated n (%)	**Very Motivated n (%)**	**Moderately Motivated n (%)**	**Slightly Motivated n (%)**	**Not Motivated at All n (%)**
2. To what extent are you motivated to engage in activities that can help prevent knee osteoarthritis?	85 (22.4)	137 (36.1)	112 (29.5)	41 (10.8)	5 (1.4)
	Extremely Effective n (%)	**Very Effective n (%)**	**Moderately Effective n (%)**	**Slightly Effective n (%)**	**Not Effective at All n (%)**

3. How effective do you think prevention measures for knee osteoarthritis will be?	86 (22.7)	123(2.4)	134(35.3)	34 (9.0)	3 (0.8)
	Extremely Important n (%)	**Very Important n (%)**	**Moderately Important n (%)**	**Slightly Important n (%)**	**Not Important n (%)**
4. How important is it to avoid high-impact sports (e.g. basketball, football, etc.) to maintain knee health?	79 (20.8)	69 (18.2)	111 (29.3)	114 (30.0)	7 (1.8)
5. How important it is to maintain an ideal body mass index (BMI) in preventing knee osteoarthritis?	66 (17.4)	76 (20.0)	137 (36.1)	97 (25.6)	4 (1.1)
	Very Likely n (%)	**Likely n (%)**	**Neutral n (%)**	**Unlikely n (%)**	**Very Unlikely n (%)**
6. How likely do you think you will get knee osteoarthritis in the future?	57 (15.0)	81 (21.4)	83 (21.9)	148 (39.0)	11 (2.9)

7. How likely Do you think your older family members will get knee osteoarthritis in the future?	84 (22.2)	148 (39.0)	94 (24.8)	43 (11.4)	11 (2.9)
	Very keen **n (%)**	**Keen** **n (%)**	**Neutral** **n (%)**	**Unkeen** **n (%)**	**I don't want to learn at all** **n (%)**
8. How keen are you to learn about the methods if you do not know the preventive methods of knee osteoarthritis previously?	97 (25.6)	165 (43.5)	83 (21.9)	27 (7.2)	8 (2.2)

Table 4.8: Frequency table of attitude towards knee OA prevention responses in frequency (n) and percentage (%)

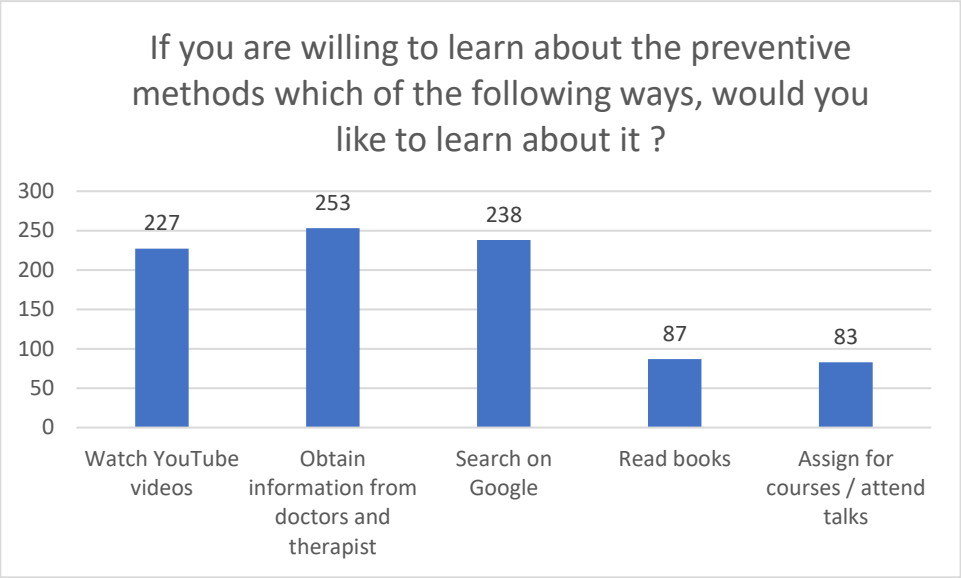

Figure 4.8: Frequency (n) of each selection for ways to learn preventive methods of knee OA.

The relationship between participants' attitudes toward knee OA prevention and their knee OA knowledge level was analyzed to identify any significant differences across the items of the attitude questionnaire. Attitude responses, measured using a Likert scale ranging from "Extremely Important" to "Not Important at All," were grouped into three categories: (1) "Extremely Important" and "Very Important," (2) "Moderately Important," and (3) "Slightly Important" and "Not Important at All". The grouping will be similar to other items according to the level. A Kruskal-Wallis H test was conducted to compare responses for items 1 to 7 with participants' knee OA knowledge scores, with results summarized in Table 6.9. Items 8 and 9 were used to identify the attitudes of participants toward learning knee OA prevention and the ways they prefer to learn knee OA prevention.

For item 1, the mean ranks were 193.43 (group 1), 185.62 (group 2), and 178.36 (group 3), with a p-value of 0.722. For item 2, the mean ranks were 188.87, 191.89, and 194.97, with a p-value of 0.931. Similarly, for item 3, mean ranks were 189.52, 190.69, and 195.36, with a p-value of 0.956. Item 4 showed mean ranks of 182.06, 194.16, and 197.47, with a p-value of 0.475. For item 5, the mean ranks were 187.28, 200.81, and 181.04, with a p-value of 0.353. Item 6 presented mean ranks of 187.60, 189.65, and 193.46, with a p-value of 0.897. Lastly, item 7 recorded mean ranks of 186.01, 191.37, and 208.28, with a p-value of 0.404.

All p-values were greater than the significance threshold of 0.05, indicating no statistically significant relationship between participants' knee OA knowledge levels and their attitudes toward knee OA prevention. This suggests that the knowledge of knee OA does not significantly influence young adults' attitudes toward preventive measures.

	Mean Rank			
Item	**Group 1**	**Group 2**	**Group 3**	**p-value**
1. Do you think it is important to take preventive measures against knee osteoarthritis?	193.43	185.62	178.36	0.722 (>0.05)
2. To what extent are you motivated to engage in activities that can help prevent knee osteoarthritis?	188.87	191.89	194.97	0.931 (>0.05)
3. How effective do you think prevention measures for knee osteoarthritis will be?	189.52	190.69	195.36	0.956 (>0.05)
4. How important is it to avoid high-impact sports (e.g. basketball, football, etc.) to maintain knee health?	182.06	194.16	197.47	0.475 (>0.05)
5. How important it is to maintain an ideal body mass index (BMI) in preventing knee osteoarthritis?	187.28	200.81	181.04	0.353 (>0.05)
6. How likely do you think you will get knee osteoarthritis in the future?	187.60	189.65	193.46	0.897 (>0.05)

7. How likely Do you think your older family members will get knee osteoarthritis in the future?	186.01	191.37	208.28	0.404 (>0.05)

Table 4.9: Summary of the mean ranks and p-values for each attitude questionnaire item.

CHAPTER 5

5.0 DISCUSSION

CHAPTER OVERVIEW

This chapter highlights the results of the study's findings and discusses them in light of previous research. The key findings are summarised in the summary of findings, which is followed by a comparison of existing literature and knee OA knowledge level and participants' attitudes towards prevention with those of another research. The chapter also discusses the study's limitations, providing information on possible obstacles and limitations as well as recommendations for further research to direct future studies. The study's contributions and suggested public health implications are finally summed up in the conclusion.

5.1 Summary of Findings.

The sample in this study consists of 380 participants where majority of them were from the 21-24 age group. The family income level distribution in this study is fairly average and the majority of participants have a family income of RM2,000 – RM4,999 (35.26%). With a total of n=380 participants, 50.0% of participants showed a low knee OA knowledge level by using knee OAKS, and 49.0% of participants had a low knee OA prevention knowledge level by using prevention questionnaires. The participants involved were mostly Chinese (63.95%) and the majority of the total participants were tertiary educational level (77.11%). This shows very large differences within groups which may cause an

imbalance of distribution in this study. It highlights the need for future studies to include more average samples in terms of age groups, race, educational level, and family income level.

Although (57.9%) of participants reported no knee pain in the past six months but there is a significant proportion (42.1%) of participants did experience knee pain in the past six months. A study by Snoeker et al. (2020) identified various risks for knee injuries among young adults, including cruciate ligament injuries, meniscal tears, and knee bone fractures such as tibial plateau or patellar fractures. These injuries contribute to an increased risk of developing knee osteoarthritis (OA) later in life, underscoring the heightened vulnerability of young adults to future knee OA. Consistent with these findings, this study revealed that the primary reported causes of knee pain among participants were exercise-related activities (58 responses) and sports injuries (46 responses) among those who experienced knee pain in the past six months.

5.2. Comparison of knee OA knowledge level with existing literature

With the findings of Knee OAKS scores, the mean score of 26.78, median score of 26, and mode score of 22. The knee OA knowledge level was further categorized into low level (score 11-25), medium (26-40), and high (41-55). From the categorization, the findings of this study revealed that 50% of young adults have a low knowledge level about knee OA, as measured by the Knee OAKS. This aligns with previous research, such as Alghamdi et al. (2023), which reported that 64.2% of 1,638 participants lacked knowledge about knee OA, with younger individuals exhibiting significantly lower knowledge levels compared

to older groups. The low knee OA knowledge level may be due to young adults perceiving that knee OA primarily affects older people and they may have a lack of exposure to knee OA conditions. This perception may lead to a lack of motivation to seek information about OA since they do not consider themselves at risk of knee OA. A study by Elgaddal et al. (2024) shows that arthritis condition has increased along with age from 3.6% among the 18-34 age group and 53.9 % among the 75 and older age group. According to the prevalence data, knee OA is still prevalent in younger populations even though its incidence rises with age, suggesting that awareness has to be increased.

With the findings of knee OA *prevention* questionnaire scores, the mean score of 5.15, median score of 6, and mode score of 6. The knee OA *prevention* knowledge level was further categorized into low level (score 1-5), medium (score 6-7), and high (score 8-10). From the categorization, 49.0% have a low knowledge level of knee OA prevention. The main distinction between the Knee OAKS and questionnaires about the knowledge level of knee OA prevention is the insufficient number of prevention methods covered in the Knee OAKS. This may cause an inadequate ability to assess knowledge levels of knee OA prevention. Therefore, the questionnaire regarding the knowledge level of knee OA prevention was designed to assess the understanding of specific knee OA prevention among young adults. Based on the findings above, Ganasegeran et al. (2014) also found that 53.6% of middle-aged adults had poor knowledge about knee OA. These studies consistently highlight gaps in knowledge level regarding knee OA, this reinforces the need for targeted educational initiatives to improve understanding, particularly among younger populations.

Moreover, male young adults demonstrated significantly higher Knee OAKS scores than their female counterparts, with a p-value of less than 0.05. This finding aligns with the study by Ganasegeran et al. (2014), which reported that female participants had a lower knowledge level of knee OA than males. This suggests further qualitative research study to explore the reasons behind how males show higher knee OA knowledge levels compared to females.

In the present study, there was no significant difference with gender in knee OA *prevention* knowledge level. but males had a higher mean rank (194.03) than females (187.45). This indicates that males have a higher knowledge level when compared with females. Similarly, a study by Alyami et al. (2020), which included a sample comprising 50% females, found that the overall knowledge level about knee osteoarthritis was low. These studies emphasize that females generally exhibit lower levels of knowledge than males, which highlights the need for future interventions specifically targeted at improving knowledge among female young adults.

Meanwhile, the results indicate that race does not have a significant impact on knee OA knowledge levels and knee OA *prevention* knowledge levels, as the p-value exceeded the 0.05 significance threshold. However, the mean rank trends among the three racial groups differed, with Malays having a higher mean rank compared to Chinese and Indians. This suggests that Malays may possess a relatively higher knee OA knowledge level based on the Knee OAKS scores. This finding is particularly noteworthy given that a study by Mat et al. (2019) reported a higher prevalence of knee OA symptoms among Malays (44.6%) compared to Chinese (31.9%) and Indians (25.7%) in Malaysia. However, the race distribution in the present study was not normal and may affect the result

findings that caused it was no significant differences between race and knee OA knowledge level. Further investigation may focus on Malay participants in future studies.

The results indicate that knee OA knowledge levels and knee OA *prevention* knowledge levels were not significantly influenced by differences in educational levels, as the p-value exceeded the standard significance threshold of 0.05. However, the observed mean ranks varied, with tertiary education showing a higher mean rank than secondary education. Primary education was considered an outlier due to the very small sample size (only two respondents), making it ineffective for meaningful mean rank comparisons. In this study, the higher mean rank for tertiary education suggests that individuals with higher educational attainment tend to have better knee OA knowledge compared to those with secondary education. A study by Nutbeam (2000) emphasizes the personal, cognitive, and social skills required to access, understand, and use health information effectively. This highlights the role of better education in improving health literacy, which could contribute to better knowledge of conditions such as knee OA. However, the non-normal distributed educational level data may contribute to the result of no significant differences between educational level and knee OA knowledge level.

Family income levels do not significantly influence knee OA knowledge and knee OA *prevention* knowledge levels, as the p-value exceeded the 0.05 significance threshold. However, mean rank trends varied among income groups, with individuals from families earning RM5,000 to RM9,999 and RM10,000 to RM14,999 achieving the highest mean rank respectively. This demonstrates that both family income level with higher mean ranks has greater knee OA

knowledge and knee OA prevention knowledge when compared to other income levels. This suggests that individuals with other family incomes below both mentioned family income levels possess lower knee OA knowledge and knee OA prevention knowledge levels. Azzeri (2021) highlighted that knee arthroplasty is the most expensive orthopedic surgical procedure for managing chronic knee OA. It costs approximately USD 7,500 per knee in Malaysia. These costs can increase further due to additional inpatient and pharmacy services. Without appropriate interventions, the financial burden of knee OA is expected to escalate for young adults. Therefore, enhancing knowledge and awareness of knee OA prevention is crucial to mitigating this growing burden. However, the data on family income level in the present study was not normal distribution and this may contribute to the result of no significant differences between family income level and knee OA knowledge level. It is suggested that future studies assess the specific personal income levels of young adults because this will consider the variations between single-parent and double-parent families that may affect the level of family income level.

5.3. Comparison of attitude toward knee OA prevention with existing literature

It is important to have a good attitude towards prevention methods because this may directly affect good behaviour. Jeihooni et al. (2021) about educational intervention in the prevention measure of knee osteoarthritis in the experimental group has improved the attitude towards knee osteoarthritis prevention behaviour compared to the control group. This indicates that a better attitude

towards knee osteoarthritis prevention measures will increase the preventive behaviour and practices that aim to reduce the morbidity of knee osteoarthritis.

The p-value obtained was greater than the significant threshold of 0.05 which indicates that no significant difference between the knee OA knowledge level and their attitude toward knee OA prevention. This also concludes that knee OA knowledge levels do not affect the attitude of young adults toward knee OA preventive measures. Most items have shown that the majority of young adults have favourable attitudes towards knee OA prevention (i.e. choices of extremely important / very important), except for the following items.

Item 4 with the question “How important is it to avoid high-impact sports (e.g. basketball, football, etc.) to maintain knee health?” shows 30.0% of participants selected “slightly important” and 29.3% of participants selected “moderately important”. This shows that young adults most likely think that high-impact sports will not cause them to get knee OA effectively. This may be due to young adults thinking that they are less susceptible to knee OA as it is more often associated with older adults. This can cause them to underestimate the impact of injury during high-impact sports. This suggests that future educational interventions provide more attention and information about safety precautions during high-impact sports to prevent the risk of knee injury that can increase the risk of knee OA among young adults.

Another item 5 with the question “How important it is to maintain an ideal body mass index (BMI) in preventing knee osteoarthritis?” shows 36.1% of participants selected “moderately important” and 25.6% of participants selected "slightly important”. The relationship between obesity and the development of

knee OA is not well understood by many young adults. They may not associate their unhealthy lifestyle choices that will be affecting their knee joint health in the future. A study by King et al. (2013) has shown a strong relationship between high BMI and a higher risk of OA development. They may think that OA primarily affects older people rather than causes development at younger ages. This suggests that future educational interventions among young adults should provide more information about the effect of obesity that can contribute to knee OA development.

Items 1, 2, 3, 4, and 5 observed the attitude of young adults with negative thoughts toward the knee OA preventive measures. Health information is crucial, but it has no discernible impact on health attitudes. A study by Alves (2023) shows that despite having health information, university students may still engage in harmful behaviors because of their negative attitudes. The study hypothesis that greater health knowledge would lead to more positive health attitudes was not supported, suggesting that students may have health knowledge but still engage in risky behaviors due to their attitudes. For example, even when students knew the risks of smoking, they were more likely to smoke if they had negative attitudes about it. There is also a study by Wu et al. (2024) about the knowledge, attitude, and practice of patients with knee OA towards osteoporosis and its prevention. The study states that the patients with a higher knowledge level will practice the prevention measures more effectively. It has shown the effectiveness of behavior on prevention measures relies on the young adults' knowledge level of knee osteoarthritis. Thus, knowledge is a critical point for a change of behavior but it does not directly turn into positive attitudes. Understanding the importance of the interplay between knowledge and attitude

is essential for developing effective educational programs or interventions to target a positive health practice.

Items 6 and 7 observed that most young adults in this study believe that they will not get knee OA in the future, but they believe their older family members will get knee OA easily. This perception may need to be addressed in future interventions. An observational study by Acharya & Patel (2023) examined the incidence of different risk factors for knee OA in young adults. It identified several modifiable risk factors, such as malalignment, physical activity levels, muscle strength, and body mass index (BMI). The study indicated that 69.62% of young adults exhibited malalignment, while 66.66% reported inadequate physical activity, both contributing to the likelihood of young adults developing knee OA. The results of the present study show young adults do not personally feel at risk of knee OA. Therefore, young adults' knee OA knowledge and attitude should be raised as soon as feasible.

Item 8 shows that young adults are willing to learn about knee OA preventive methods. The most preferable ways to learn knee OA preventive methods are to obtain information from doctors and therapists with a majority of 253 votes, then followed by searching on Google with 238 votes, and by watching YouTube videos with 227 votes. The learning ways of young adults are preferable to include social media and apps such as Google and YouTube, this can be considered in future knee OA knowledge and attitude interventional studies.

5.4. Limitations of this study

The sample in this study includes young adults who are not normally distributed into age groups, races, educational levels and total family income levels. Schenkelberg, (n.d.) emphasizes the importance of normal distribution in various statistical applications, such as charts and process capabilities. It is suggested to have an equal number of participants when considering age groups, race, educational levels, and family income levels in future studies.

Another limitation of this study is it doesn't provide statistical evidence for reliability or validity. For example, the internal consistency of the questionnaire or its test-retest reliability is not addressed by expert reviews alone. It is suggested for future studies to consider performing additional statistical tests such as factor analysis to check for construct validity, or Cronbach's alpha to assess internal consistency.

5.5. Suggestion for future study

It is suggested that future qualitative studies explore the underlying reasons behind the low knee OA knowledge level among young adults. Such studies could provide a more comprehensive understanding of the issue and investigate the factors that need to be improved, such as lack of educational information, urge need for awareness campaigns, and cultural or lifestyle influences.

Future studies may focus on the young adults' preferred ways to learn knee OA prevention while providing educational intervention. From the findings, it is important to improve the attitude of young adults towards knee OA prevention as they do not feel personally at risk of knee OA. Future studies may provide an

interactive campaign by including social media or apps to attract young adults' involvement, for example including gamified content, quizzes, and challenges to make the learning process more enjoyable and easier to memorize.

Another study by Nissen et al. (2022) highlighted a lack of interest and knowledge among clinicians regarding physical activity and exercise therapy as treatment modalities for knee OA. These findings underscore the need for future research to focus on improving the attitude of clinicians and their understanding of evidence-based interventions of modifiable knee OA risk factors. By doing so, enhancing clinicians' perspectives could positively influence their ability to educate and motivate patients which include young, middle-aged, and older adults. This may lead to individuals adopting preventive strategies that target modifiable risk factors for knee OA.

5.6. Conclusion

The findings of the present study demonstrate that gender significantly influences knowledge levels regarding knee osteoarthritis (OA), with males exhibiting greater knowledge compared to females. Given that females are at higher risk for developing knee OA, future research should prioritize educational interventions targeting young females to enhance their knowledge of knee OA and its prevention.

Conversely, factors such as race, educational level, and family income did not show a significant impact on knee OA knowledge or attitudes toward its prevention. This result may be attributed to the non-normal distribution of the present sample in terms of race and educational levels. This could have affected

the data analysis in the present study. Future studies are encouraged to address these limitations by ensuring a more representative sample to explore these factors comprehensively.

The study also revealed that knowledge about knee OA does not significantly influence attitudes toward its prevention among young adults. This finding suggests that fostering positive health behaviors may require targeted efforts to improve both knowledge and attitudes independently. Early diagnosis and prevention of knee OA symptoms are crucial for reducing the burden of this condition, emphasizing the need to enhance awareness and proactive attitudes within the young population.

In light of these findings, further research should investigate the interplay between knowledge and attitudes to develop effective interventions that promote preventive measures for knee OA. Strengthening the understanding and attitudes of young individuals can play a pivotal role in reducing the future impact of knee OA on individuals and healthcare systems alike.

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APPENDIX A

DEMOGRAPHIC DATA

1. Name: _____
2. Age: [] 17-20 [] 21-24 [] 25-28
3. Gender:

   [] Female [] Male [] Other genders
4. Race:

   [] Malay [] Chinese [] Indian [] Kadazan [] Iban
5. Which state and district are you from?

   [] Selangor (district: [] Gombak [] Hulu Langat [] Klang [] Kuala Langat [] Petaling [] Sabak Bernam [] Sepang)

   [] Other state: ___ (district: __)
6. What is your highest education level attained?

   [] Never been to school [] Primary [] Secondary [] Tertiary
7. What is the total monthly income of your entire household? Please select the option that best represents your total family income:

   [] Less than RM2,000 [] RM2,000 – RM4,999

   [] RM5,000 – RM9,999 [] RM10,000 – RM14,999

   [] RM15,000 or more
8. In the past 6 months, have you experienced knee pain?

   [] Yes [] No [] I am not sure.
9. What is the reason for your knee pain?

   [] exercise related. [] fall

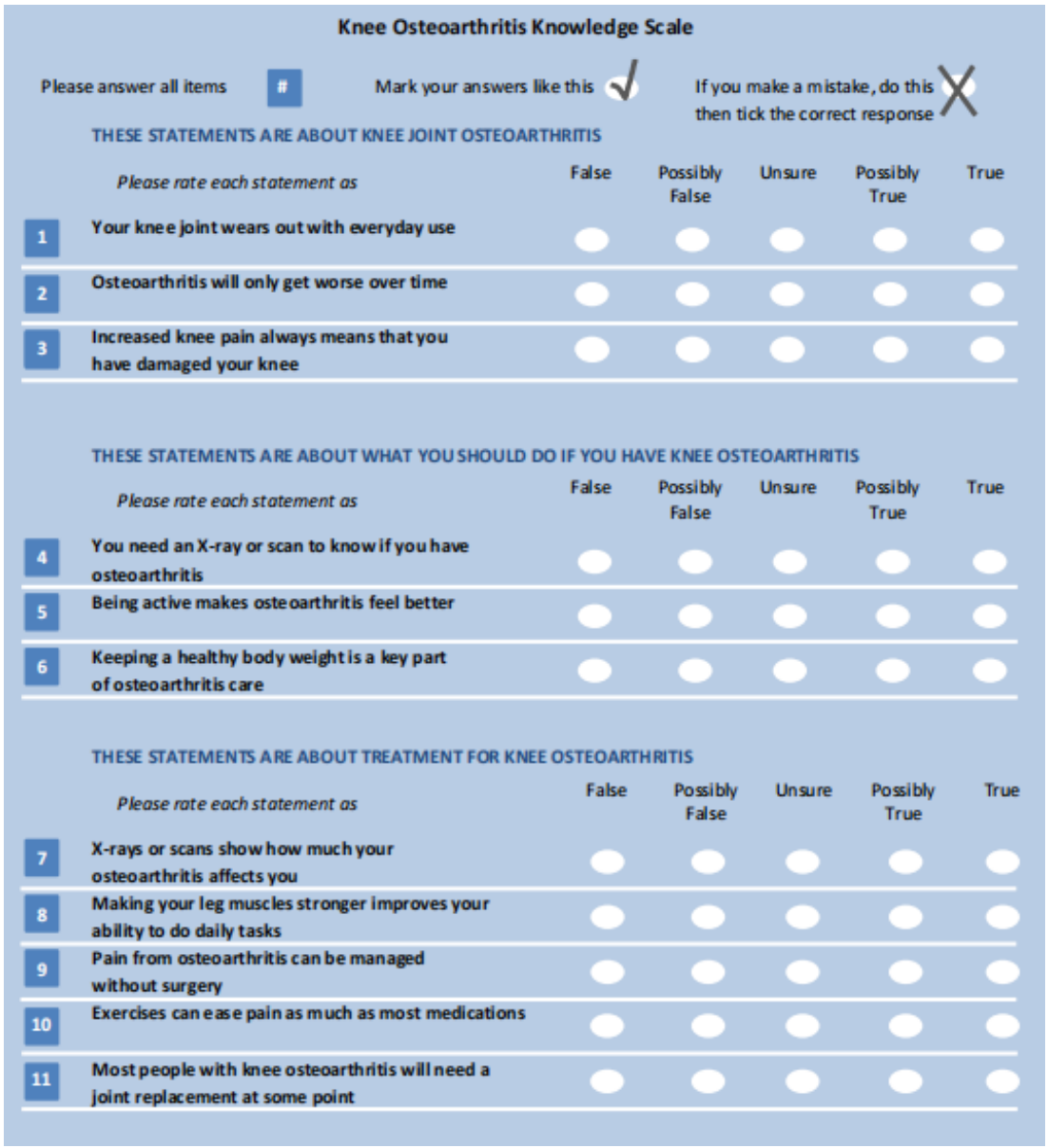
   [] sports injury [] overuse during work

   [] others___

APPENDIX B

QUESTIONNAIRE TO ASSESS THE KNOWLEDGE LEVEL OF KNEE OSTEOARTHRITIS

KNEE OSTEOARTHRITIS KNOWLEDGE SCALE



Knee Osteoarthritis Knowledge Scale

Please answer all items # Mark your answers like this ✓ If you make a mistake, do this then tick the correct response ✗

THESE STATEMENTS ARE ABOUT KNEE JOINT OSTEOARTHRITIS

	Please rate each statement as	False	Possibly False	Unsure	Possibly True	True
1	Your knee joint wears out with everyday use	○	○	○	○	○
2	Osteoarthritis will only get worse over time	○	○	○	○	○
3	Increased knee pain always means that you have damaged your knee	○	○	○	○	○

THESE STATEMENTS ARE ABOUT WHAT YOU SHOULD DO IF YOU HAVE KNEE OSTEOARTHRITIS

	Please rate each statement as	False	Possibly False	Unsure	Possibly True	True
4	You need an X-ray or scan to know if you have osteoarthritis	○	○	○	○	○
5	Being active makes osteoarthritis feel better	○	○	○	○	○
6	Keeping a healthy body weight is a key part of osteoarthritis care	○	○	○	○	○

THESE STATEMENTS ARE ABOUT TREATMENT FOR KNEE OSTEOARTHRITIS

	Please rate each statement as	False	Possibly False	Unsure	Possibly True	True
7	X-rays or scans show how much your osteoarthritis affects you	○	○	○	○	○
8	Making your leg muscles stronger improves your ability to do daily tasks	○	○	○	○	○
9	Pain from osteoarthritis can be managed without surgery	○	○	○	○	○
10	Exercises can ease pain as much as most medications	○	○	○	○	○
11	Most people with knee osteoarthritis will need a joint replacement at some point	○	○	○	○	○

The Knee Osteoarthritis Knowledge Scale Scoring instructions

There are 11-items that contribute to the score. Each item presents a statement with a five-point Likert scale. Each item is scored on a scale from 1 to 5.

To compute the score, reverse score items 1,2, 3, 4, 7, and 11 and add these to items 5, 6, 8, 9, and 10. Total scores for the scale range from 11 to 55, and higher scores indicate greater knowledge about osteoarthritis.

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APPENDIX C

QUESTIONNAIRE TO ASSESS THE KNOWLEDGE LEVEL OF KNEE OSTEOARTHRITIS PREVENTION

Which of the following preventions will reduce the risk of getting knee osteoarthritis?

Please [/] for the correct choice and leave blank for the wrong choice.

1. Having a healthier diet	
2. Long periods of rest	
3. Avoid high-impact sports (e.g. basketball, football, etc.)	
4. Avoid occupations requiring high physical loads (e.g. construction workers, repair workers, etc.)	
5. Consider consuming more hot/warm water	
6. Maintain good body mass index (BMI)	
7. Regularly providing a hot pack around the knee joint	
8. Avoid knee joint trauma (e.g. anterior cruciate ligament (ACL) tear, meniscal tears, intra-articular fractures of knee, etc.)	
9. Regularly massage around the knee joint	
10. Exercise and strengthen the muscle around the knee joint (e.g., quadriceps, hamstrings, etc.)	

Scoring instructions:

Numbers 3, 4, 6, 8, and 10 are the correct knee OA prevention method whereas the numbers 1, 2, 5, 7, and 9 are the incorrect knee OA prevention method. The participants will obtain 1 point for each correct selection and be left blank for wrong choices. The participants will obtain 0 points for incorrect filling up, and a higher score indicates higher knowledge of knee OA prevention methods.

APPENDIX D

QUESTIONNAIRE TO ASSESS THE ATTITUDE TOWARD KNEE OSTEOARTHRITIS PREVENTION

1. Do you think it is important to take preventive measures against knee osteoarthritis?
   [] Extremely Important
   [] Very Important
   [] Moderately Important
   [] Slightly Important
   [] Not Important at All
2. To what extent are you motivated to engage in activities that can help prevent knee osteoarthritis?
   [] Extremely Motivated
   [] Very Motivated
   [] Moderately Motivated
   [] Slightly Motivated
   [] Not Motivatedat All
3. How effective do you think prevention measures for knee osteoarthritis will be?
   [] Extremely Effective
   [] Very Effective
   [] Moderately Effective
   [] Slightly Effective
   [] Not Effective at All
4. How important is it to avoid high-impact sports (e.g. basketball, football, etc.) to maintain knee health?
   [] Extremely Important
   [] Very Important
   [] Moderately Important
   [] Slightly Important
   [] Not Important at All
5. How important it is to maintain an ideal body mass index (BMI) in preventing knee osteoarthritis?

[] Extremely Important

[] Very Important

[] Moderately Important

[] Slightly Important

[] Not Important at All

6. How likely do you think you will get knee osteoarthritis in the future?

   [] Very Likely

   [] Likely

   [] Neutral

   [] Unlikely

   [] Very Unlikely

7. How likely do you think your older family members will get knee osteoarthritis in the future?

   [] Very Likely

   [] Likely

   [] Neutral

   [] Unlikely

   [] Very Unlikely

8. How keen are you to learn about the methods if you do not know the preventive methods of knee osteoarthritis previously?

   [] Very keen.

   [] Keen

   [] Neutral

   [] Unkeen

   [] I don't want to learn at all

9. If you are willing to learn about the preventive methods which of the following ways, would you like to learn about it?

   [] Watch YouTube videos

   [] Obtain information on osteoarthritis from doctors/therapist

   [] Search on Google

   [] Read books

   [] Assign for courses / attend talks

   [] Other:__

APPENDIX E – INFORMED CONSENT FORM

A CROSS-SECTIONAL STUDY ON THE KNOWLEDGE OF KNEE OSTEOARTHRITIS AND ATTITUDE TOWARDS PREVENTION OF KNEE OSTEOARTHRITIS IN YOUNG ADULTS

Dear participants,
Hello there, my name is Lim Shi Qi and I am a student from Universiti Tunku Abdul Rahman (UTAR) Sungai Long studying for Bachelor of Physiotherapy (Honours). I am conducting a study for my UMFD3026 Research Project. My study aims to explore the knowledge of knee osteoarthritis (OA) and attitude towards prevention of knee osteoarthritis in young adults.

Purpose of the Study

This cross-sectional study aims to comprehensively assess the knowledge of knee osteoarthritis (OA) and the attitudes toward its prevention among young adults. By examining how factors such as gender, race, educational levels, and family income influence these aspects, the study seeks to identify significant associations that could inform targeted educational interventions and public health strategies to enhance awareness and preventive behaviors regarding knee OA in this demographic.

Your Participation

Your participation is entirely voluntary, and your responses will remain anonymous and will be kept confidential and used solely for academic purposes. Please answer the questions to the best of your knowledge and experience. Your participation will provide invaluable information on the current understanding of how clinical experiences and education affect the knowledge level and care practice in this condition.

Instructions

- Questionnaire consists of 3 parts.
- Please read each question carefully.
- Select the best response that reflect your opinion.
- The questionnaire may take approximately 5-10 minutes to complete.

Contact Information

If you have any enquiries about this questionnaire or research study, you may contact me at limshiqi03@1utar.my.

Thank you for your time and participation.

Sincerely,

Lim Shi Qi

This form is automatically collecting emails from all respondents. Change settings

APPENDIX F – PERSONAL DATA PROTECTION NOTICE

PERSONAL DATA PROTECTION NOTICE

Please be informed that in accordance with Personal Data Protection Act 2010 ("PDPA") which came into force on 15 November 2013, Universiti Tunku Abdul Rahman ("UTAR") is hereby bound to make notice and require consent in relation to collection, recording, storage, usage and retention of personal information.

1. Personal data refers to any information which may directly or indirectly identify a person which could include sensitive personal data and expression of opinion. Among others it includes:
a) Name
b) Identity card
c) Place of Birth
d) Address
e) Education History
f) Employment History
g) Medical History
h) Blood type
i) Race
j) Religion
k) Photo
l) Personal Information and Associated Research Data

2. The purposes for which your personal data may be used are inclusive but not limited to:
a) For assessment of any application to UTAR
b) For processing any benefits and services
c) For communication purposes
d) For advertorial and news
e) For general administration and record purposes
f) For enhancing the value of education
g) For educational and related purposes consequential to UTAR
h) For replying any responds to complaints and enquiries
i) For the purpose of our corporate governance
j) For the purposes of conducting research/ collaboration

3. Your personal data may be transferred and/or disclosed to third party and/or UTAR collaborative partners including but not limited to the respective and appointed outsourcing agents for purpose of fulfilling our obligations to you in respect of the purposes and all such other purposes that are related to the purposes and also in providing integrated services, maintaining and storing records. Your data may be shared when required by laws and when disclosure is necessary to comply with applicable laws.

4. Any personal information retained by UTAR shall be destroyed and/or deleted in accordance with our retention policy applicable for us in the event such information is no longer required.5. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing strict policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.

5. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing strict policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.

Consent:
6. By submitting or providing your personal data to UTAR, you had consented and agreed for your personal data to be used in accordance to the terms and conditions in the Notice and our relevant policy.

7. If you do not consent or subsequently withdraw your consent to the processing and disclosure of your personal data, UTAR will not be able to fulfill our obligations or to contact you or to assist you in respect of the purposes and/or for any other purposes related to the purpose.

8. You may access and update your personal data by writing to limshiqi03@1utar.my.

Acknowledgment of Notice *

- ( ) I have been notified and that I hereby understood, consented and agreed per UTAR above notice.
- ( ) I disagree, my personal data will not be processed.

APPENDIX G – TURNITIN REPORT

Dear Examiners,

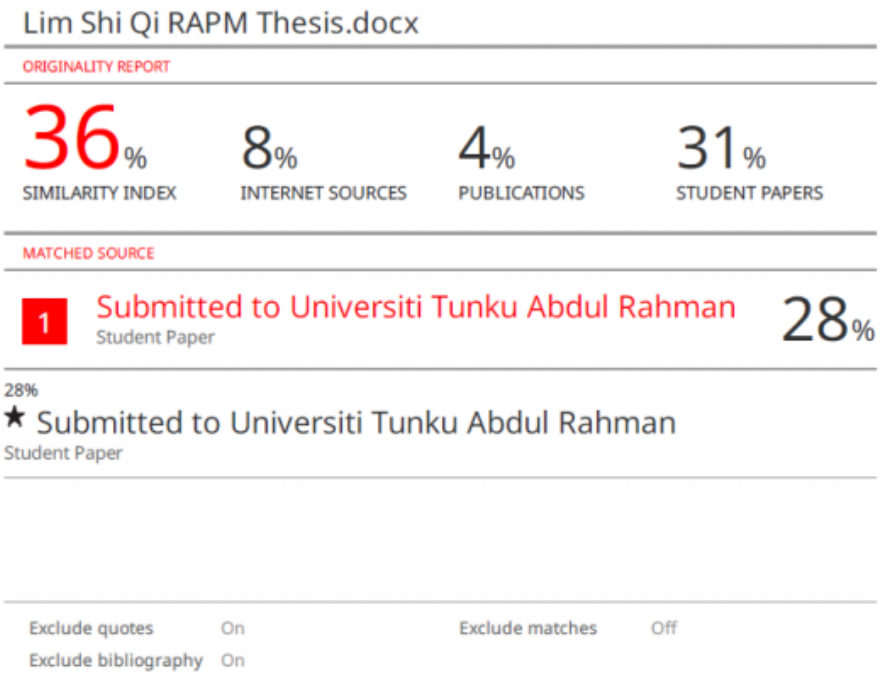
Below is my mistake, I submitted this student's file into Turnitin 2 times. The similarity Index 28 % is actually similarity between the 2 files I submitted. – I checked it.

Actual Similiarity would be about 7%

Pls give me a call if you have any queries.

Regards,

Mahadevi



APPENDIX H – EXPERTS REVIEW

(B) QUESTIONNAIRE TO ASSESS THE KNOWLEDGE OF KNEE OSTEOARTHRITIS PREVENTION

Item No.	Questions	Expert 1 Ratin	Expert 2 Ratin	Expert 3 Ratin	Expert 4 Ratin	Average	Comments
1	Eat more vegetables	4	2	4	2	3.00	> Instead of vege, ask other intake (certain vitamin/nutrients etc.) > PERHAPS INSTEAD OF EAT MORE VEGETABLES CAN CONSIDER HAVING A MORE HEALTHIER DIET. DOES
2	Prolong rest	2	3	4	3	3.00	> needs more clarity. Do you mean take more frequent rests? Rest for longer periods of time? > MAYBE BE MORE CLEAR IN TERM OF HOW LONG YOU DEFINE AS PROLONGED REST
3	Avoid high-impact sports (e.g. basketball,	4	3	4	4	3.75	
4	Avoid high physical load occupations (e.g. construction workers, repair	4	3	4	4	3.75	> suggest: Avoid occupations requiring high physical loads
5	Drink more hot/warm water	4	2	4	2	3.00	> Maybe can phrase it as "drinking warm water rather than cold water will benefit my condition. "
6	Control body weight	3	3	4	4	3.50	> needs to be more specific, perhaps provide BMI? Use the word "maintain"? > PHRASE IT INSTEAD AS: IT IS IMPORTANT TO MAINTAIN A GOOD BODY WEIGHT
7	Provide hot pack around knee joint	4	3	4	4	3.75	> suggest: Regularly providing hot pack...
8	Avoid knee joint trauma	4	4	4	3	3.75	> suggest: Avoid trauma to the knee joint > Please provide examples
9	Massage around knee joint	4	3	4	4	3.75	> suggest: Regularly massage...
10	Strengthen the muscle around the knee joint (e.g. quadriceps, hamstrings and	4	2	4	4	3.50	

(C) QUESTIONNAIRE TO ASSESS THE ATTITUDE TOWARD KNEE OSTEOARTHRITIS PREVENTION QUESTIONS

Item No.	Questions	Expert 1 Ratin	Expert 2 Ratin	Expert 3 Ratin	Expert 4 Ratin	Average	Comments
1	How important do you believe it is to take preventive measures against knee	4	4	4	4	4.00	> suggest to provide a direct question, eg. Do you think it is important to take...against knee OA? Also, remove the word "believe" as it veers into the territory of questionnaire items on Belief instead of Attitude
2	To what extent are you motivated to engage in activities that can	4	4	4	3	3.75	
3	How effective do you think prevention measures for knee	4	4	3	2	3.25	> similar to Item 1, suggest to provide a direct question > DO YOU HAVE EXAMPLES OF PREVENTITIVE MEASURES THAT YOU WANT THE RESPONDANT TO JUDGE?
4	you think it is to avoid high-impact sports to maintain knee health?	4	4	4	3	3.75	> similar to Item 1, suggest to provide a direct question > CAN GIVE EXAMPLES OF HIGH IMPACT SPORTS: IE : JUMPING, BASKETBALL, SOCCER, ETC.
5	How important do you think weight loss is in preventing knee osteoarthritis?	4	4	3	3	3.50	> similar to Item 1, suggest to provide a direct question > AGAIN FOR A NORMAL BMI PATIENT DOES WEIGHT LOSS STILL NECESSARY, MAYBE CAN PHRASE THE QUESTION INSTEAD AS: HOWW IMPORTANT IS MAINTAINING AN IDEAL WEIGHT/ BMI IS FOR PREVENTING KNEE OA?
6	How likely do you think you will get knee osteoarthritis in the future?	4	4	4	4	4.00	
7	How likely do you think your older family members will get knee osteoarthritis in the future?	4	4	4	4	4.00	
8	If you do not know of the preventive methods of knee osteoarthritis, how keen are you to learn about the	4	4	4	4	4.00	