ROPHECA PHUAH SU HUI PREVALENCE OF VARICOSE VEINS AMONG FAST FOOD WORKERS 2022

PREVALENCE OF VARICOSE VEINS AMONG FAST FOOD WORKERS IN CHERAS, SELANGOR: A CROSS-SECTIONAL STUDY

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BY

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A Research Proposal submitted to the Department of Physiotherapy,

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PREVALENCE OF VARICOSE VEINS AMONG FAST FOOD WORKERS IN CHERAS, SELANGOR: A CROSS SECTIONAL STUDY.

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ABSTRACT

Background and Objective: Varicose veins (VVs) is a chronic venous disease which commonly develops in lower extremities. Varicose veins are irregular, tortuous and dilated veins of the superficial venous system due to the pooling of blood. Varicose veins can be caused by several risk factors such as age, obesity, heavy lifting, pregnancy, and long-standing hours. Although varicose vein is classified as a work-related disease due to prolonged standing, there are still limitations on epidemiological studies on working populations. Therefore, the objective of the present study is to determine the prevalence of varicose veins and identify the associated risk factors among fast food workers in Cheras, Selangor.

Methods: The sampling method used in this study was convenience sampling and the sample size was calculated to be at 210 fast food workers. A descriptive cross-sectional study was conducted among fast food workers in Cheras, Selangor. A self-modified validated questionnaire using Google Forms will be distributed to the fast-food workers via QR scan or social medias. The data collected will be analysed using SPSS 26.0. Significance level will be set at $p<0.05$ while confidence level set at 95%. Chi-square test ($\chi 2$) or Fisher's exact test was used to find the association between the outcome and any categorical variable. Univariate descriptive analysis was used to find the association between the outcome and years of working experiences.

Results: Total participants were 210 fast food workers and all responses are being processed. The fast food workers consist of 120 (57.1%) males and 90 (42.9%) females. Out of 201 participants, a minority of 9 participants has diagnosed with varicose veins, representing 4.5% of the prevalence of varicose veins. Varicose veins is significantly associated with social status ($p = 0.03$), hypertension ($p = 0.03$), constipation ($p = 0.01$), diabetes mellitus ($p = 0.00$), and rheumatoid arthritis ($p = 0.06$).

Conclusion: Varicose veins among fast food workers in Cheras area had a low prevalence of varicose veins. This study has proven that there is a significant association between varicose veins and social status, hypertension, constipation, diabetes mellitus, and rheumatoid arthritis. However, awareness of varicose veins among fast food workers is significant to prevent signs and symptoms and its management.

Keywords: Cheras**,** fast food workers, risk factor, varicose veins

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APPROVAL SHEET

This Research project entitled **"PREVALENCE OF VARICOSE VEINS AMONG FAST FOOD WORKERS IN CHERAS, SELANGOR: A CROSS-SECTIONAL STUDY"** was prepared by ROPHECA PHUAH SU HUI 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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Date: 23/12/2022

PERMISSION SHEET

It is hereby certified that ROPHECA PHUAH SU HUI (ID No: 19UMB01939) has completed this Research project entitled "PREVALENCE OF VARICOSE VEINS AMONG FAST FOOD WORKERS IN CHERAS, SELANGOR: A CROSS-SECTIONAL STUDY" under the supervision of (Ms Nadia Safirah Binti Rusli) from the Department of Physiotherapy, M. Kandiah Faculty of Medical and Health Sciences, Universiti Tunku Abdul Rahman.

Yours truly,

Ropheca

(ROPHECA PHUAH SU HUI)

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: Ropheca Phuah Su Hui

Date: 23/ 12 / 2022

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

BMI	Body Mass index
CAD	Coronary Artery Disease
CVI	Chronic Venous Insufficiency
DM	Diabetes Mellitus
DVT	Deep Vein Thrombosis
DX	Diagnose
HTN	Hypertension
HX	History
KD	Kidney Disease
RA	Rheumatoid Arthritis
SD	Standard Deviation
VVs	Varicose Veins

CHAPTER 1

INTRODUCTION

1.1 Chapter overview

This chapter will outline the background of the study, providing context for the overall research project before proceeding to the importance and relevance, research objectives, research questions, operational definition of terms for the research study, rationale of study and scope of study.

1.2 Background of study

1.2.1 Chronic Venous Insufficiency (CVI) and Varicose Veins (VVs)

Chronic venous insufficiency (CVI), a condition where pooling of blood in superficial and deep saphenous veins occurs. CVI is a chronic, persistent, generally neglected condition that affects a significant proportion of the general population and has a significant socioeconomic, physical, and psychological impact (Ortega et al., 2021). The clinical spectrum of CVI of the lower extremities ranges from asymptomatic but aesthetic issues to severe symptoms (Youn & Lee, 2019). Despite the fact that it's a prevalent medical condition, healthcare professionals frequently overlook it due to the lack of awareness of the extent and significance of the issue as well as a lack of understanding of the many presenting manifestations of either primary or

secondary venous problems (Youn & Lee, 2019). Up to 50% of people have abnormal venous blood flow in their lower limbs, while the prevalence rate of CVI varies according to the population study (Youn & Lee, 2019). In the pathophysiology of CVI, genetic and environmental variables interplay to raise ambulatory venous pressure, which has a significant impact on the structure and functionality of the entire venous system (Ortega et al., 2021). A study has stated that the most widespread symptom of CVI is varicose veins (VVs). Besides VVs, telangiectasias, reticular veins, venous ulceration, atrophie blanche, lipodermatosclerosis, pigmentation, and/or eczema are the other venous signs of CVI (Youn & Lee, 2019). CVI is thought to be predisposed by increasing age, family history, extended standing, obesity, smoking, sedentary lifestyle, lower extremity injuries, past venous thrombosis, the existence of an arteriovenous shunt, high oestrogen conditions, and pregnancy (Youn & Lee, 2019). CVI typically includes the most severe symptoms, including leg ulcers, edoema, or skin abnormalities (Ortega et al., 2021). These symptoms are linked to the patients' lower quality of life (Ortega et al., 2021).

VVs are a venous disease which may appear in any part of the body, commonly develops in lower extremities where venous return to heart is weak (Ebrahimi et al., 2015). VVs of lower extremities are visible, tortuous, and dilated veins of the superficial venous system, typically larger than 3 mm, due to the pooling of blood (Zhang & Melander, 2014). Veins are thin-walled vessels that are easily extended by the chronic pooling of blood in lower extremities. Any superficial veins which are closely adhere to the skin’s surface can be varicosed. The calf muscle, also known as the "peripheral

heart," is thought to be the most important factor in enhancing venous return from the lower limbs to the heart (Ortega et al., 2021). As the vascular wall encounters sustained stretch, the effectiveness of one-way venous valves reduced, lead to valvular incompetence. Consequently, there is a reversal of blood flow and the accumulation of blood in the veins leads to increased prominence and enlargement of veins (Ali et al., 2022). Additionally, they could be the result of venous valves being congenitally absent. The valves in the superficial and deep veins may become damaged from prolonged standing, which results in an abnormally opposite direction of blood flow from the deep to the superficial veins (Busbaih et al., 2022).

1.2.2 Symptoms of varicose veins (VVs) and their impact on lifestyle

Ever since the twenty-first century, it is estimated that there is a high prevalence of VVs which may lead to several complications, or in severe cases may lead to disability and can be life-threatening (Ebrahimi et al., 2015). This abnormal venous function may cause by numerous factors, including genetics, venous thrombosis, and the loss of the elastic tissue of the venous wall (Ebrahimi et al., 2015). VVs symptoms can be localized to the afflicted area or widespread in the lower extremity. Some common localized symptoms which are prevalent such as dull aching pain, burning and itching over the affected leg known as stasis dermatitis, visibly dilated veins, discoloured skin above ankles, leg heaviness, weariness, warm leg and oedema (Ebrahimi et al., 2015). These symptoms may impact activity of daily living and decrease productivity of life (Albader et al., 2020). Besides, VVs may result in direct complications such as

venous insufficiency, thrombophlebitis, and hemorrhage, and indirect complications such as statis ulcers, chronic statis dermatitis, skin pigmentation, lipodermatosclerosis, atrophie blanche and edema (Albader et al., 2020). Hence, these complications are associated with high morbidity and VVs of lower extremities are the most common condition that has increased the cost for healthcare expenses in society (Dalboh, 2020). In addition to this, VVs may also bring huge burden and impact to one's quality of life psychologically, physically and financially (Albader et al., 2020). This may lead to low self-esteem and social isolation, resulting an increased risk of depression (Albader et al., 2020). Despite the fact that lower limb VVs appeared to be a minor cosmetic issue, they can actually be a cause of major issues that can result in missed workdays, a poorer quality of life, or even the loss of a limb or life. VVs can be prevented by taking certain preventative measures, such as elevating the legs above the level of the heart for a few minutes each day, walking frequently, maintaining body weight, and donning compression stockings (Busbaih, 2022).

1.2.3 Epidemiological factors, occupational factors, lifestyle and health related

Nowadays, VVs have developed into a curative health problem with a variety of symptoms and dangerous complications that were often seen as less important for treatment and also impacted the quality of life of the individual (Aslam et al., 2022). Numerous studies have emphasised the link between VVs and the many risk factors, particularly age - related, family history, occupations based primarily on prolonged standing, obesity, pregnancy, smoking,

alcoholism, hormonal replacement therapy (HST), constipation, diabetes, hypertension, and trauma to the lower legs (Aslam et al., 2022). Other related factors are ascites, menopause, familial tendency, thrombosis of leg veins and abdominal or pelvic pain (Mahmood et al., 2021). According to Aslam et al. (2022), western countries and developed nations have a higher prevalence of this illness. In relation to risk factors, females are more prone to develop VVs than males, with age above 35 years (Mahmood et al., 2021). According to Ebrahimi et al. (2015), an approximation of prevalence of VVs varies from 2% to 56% in men and 1% to 73% in women.

Due to vasodilation, the influence of gravity, and the effect of blood viscosity, excessive alcohol consumption can also cause this condition (Mahmood et al., 2021). Habit of smoking causes endothelial damage, oxidative stress, and hypoxia by binding carbon monoxide and nitric oxide to haemoglobin (Gourgou et al., 2002). Similar in e-cigarettes, also known as vape, the nicotine content causes the blood vessels to constrict, which over time causes the artery walls to stiffen and lost their flexibility. One of the several pathophysiologic factors that contribute to the onset of lower limb venous insufficiency is hypoxia, which is related to precapillary sphincter closure (Gourgou et al., 2002). This acute inflammation from the hypoxia would increase vascular permeability and cause edoema (Gourgou et al., 2002). Additionally, smoking and hypertension were suggested as potential modifiable risk factors for varicose veins in a recent study based on data from 502 619 UK individuals (Yuan et al., 2021).

Furthermore, numerous research had also studied at occupational mechanical exposure in terms of extended standing, sitting, walking, and lifting heavy objects; some of these studies revealed a favourable association with LLVV, while others did not (Elamrawy et al., 2021). Long periods of standing at work have been identified as a significant risk factor for varicose veins (Busbaih et al., 2022). As Ebrahimi et al. (2015) states, “There is a relationship between the severity of VVs and work history as well as body condition”. Ebrahimi et al. (2015) also mentioned that the physical condition of an occupational is considered as a risk factor for VVs. Due to their prolonged standing demands, teachers, traffic officers, bus drivers, salesperson, nurses, and construction workers are among the jobs most likely to develop varicose veins (Busbaih et al., 2022). CVI, the primary cause of VVs, affects up to 80% of the world's population in mild form, while intermediate and severe instances account for 20% to 64% and 9%, respectively, of all work-related disorders (de Lima, 2019). According to Mohamed Ghazali & Morad (2008), they found that there are numerous studies shown that employees who required to stand at work for a longer period during their work has a higher prevalence of VVs. Only a small number of studies in Iran investigated the associated risk factors of VVs, as an occupational disease (Ebrahimi et al., 2015). Therefore, we draw the conclusion that the type of occupation and body posture of an individual are two of the most significant risk factors for varicose veins (Busbaih et al., 2022). It is important to increase awareness and educate the workers regarding varicose veins to maintain a good quality of life.

1.2.4 Importance and relevance

The target population of this study focuses on fast food workers. Fast food field has been continuously popular throughout the decades which play a large role in food services, and currently there is a gradual increase of franchise outlets or vendors located in every part of Malaysia. The fast-food restaurants and vendors are usually have a minimum of 8 and maximum of 24 of operating hours where workers are required to work for long shift. Fast-food workers are entailed to stand during their whole working shift, carry heavy weights and consequently may increase the prevalence and severity of VVs. In addition, various contributing factors includes epidemiological, working related, personal lifestyle, and individual's health conditions have a significant influence in the onset and development of VVs disease. However, there is no study found to be focus on the prevalence of VVs and its associated risk factors among fast-food employees in Malaysia. Lack of studies regarding the prevalence of varicose veins in Malaysia may lead to a low awareness on VVs and its prevention as well as management. Therefore, this study will be able to identify the prevalence of VVs and its associated risk factors among fast-food workers.

1.3 Research Question

Do fast-food workers are at risk to develop varicose veins?

1.4 Objectives

a) General Objective:

To determine the prevalence of varicose veins among fast-food workers in Cheras, Selangor.

b) Specific Objective:

To identify the associated risk factors of varicose veins among fast-food workers in Cheras, Selangor.

1.5 Operational Definition

a) Prevalence is defined as the proportion of a population (fast-food workers) who have affected by a medical condition (varicose veins) at a specific point of time (Davis, 2021).

b) Varicose Vein (VV) is referred to a venous disease which may appear in any part of the body, commonly develops in lower extremities where venous return to heart is weak (Ebrahimi et al., 2015).

c) Fast food is referred as inexpensive, quick, and convenient substitutes for home-cooked meals, (National Institutes of Health (NIH), as cited in Moustafa, et al., 2018).

d) Fast food workers are referred to any person employed or permitted to work at or for a Fast-Food Establishment by any employer given job duties such as customer service, cooking, food or drink preparation, delivery, security, stocking supplies or equipment, cleaning, or routine maintenance (Fast food employee definition, n.d.). Fast food workers is also referred as workers work in street vendors.

1.6 Rationale of Study

The benefit of this study is able to identify the prevalence of varicose veins among fast food workers. There may be workers who develops symptoms of varicose veins but are not aware of its presences which may lead to certain complications. Thus, it is important for them to be aware on varicose veins and educate them on the prevention of varicose veins. Physiotherapy interventions can use to prevent and treat varicose veins among the workers. Therefore, the workers would be aware of their health condition and preventive measure are essential. Nevertheless, this study would be useful for current or future studies. Lack of studies regarding the prevalence of varicose veins in Malaysia may lead to a low awareness about this scenario.

1.7 Scope of Study

This study focuses on the determination of prevalence of varicose veins and its associated risk factors among fast-food workers in Cheras, Selangor.

CHAPTER 2

REVIEW OF LITERATURE

2.1 Chapter overview

This chapter outlines the different themes explored through past journal and literature which provides the framework for the research project.

2.2 Prevalence of Varicose Veins (VVs) and its associated risk factors

There are numerous studies estimating the prevalence of VVs across worldwide. Men and women have significantly different VVs prevalence rates (Mahmood et al., 2021). Men's rates range from 10 to 30 percent, while women's rates range from 25 to 55 percent (Mahmood et al., 2021). Beebe-Dimmer and his colleagues reported that the prevalence of VVs is higher in more developed countries (Ebrahimi et al., 2015). According to Ebrahimi, et al. (2015) and Chen & Guo (2014), an approximation of prevalence of VVs varies from 2% to 56% in men and 1% to 73% in women, probably affected by age, gender, race and case definition.

A study in Abha has reported that the prevalence of VVs among teachers was 42%, in females was 37% (Dalboh et al., 2020). In the study, age between 36 to 45 years old was the most common age group to develop VVs with a prevalence of 65% among the participants (Dalboh et al., 2020). Among

the participants who had regular exercise of minimum 3 hours per week had lower risk to develop VVs compared to those who were either had irregular or did not exercise (Dalboh et al., 2020). According to Dalboh et al., (2020), a prolonged standing was essentially related to higher danger of VVs with an approximated duration of > 3-4 hours per day and new cases of VVs are arising among professions required prolonged standing. However, there was no association found between smoking and varicose veins (Dalboh et al., 2020).

A study in Saudi Arabia reported that the prevalence of VVs among nurses was 15.8% (Ali et al., 2022). According to Ali et al., (2022), ethnicity has shown an association with VVs which considered a risk factor, as 88.2% of nurses who had VVs were Arabian, compared with 10.5% Asian and 1.3% were African. However, Ali et al. (2022) suggested that the findings were not valid as the number of participants are varied by ethnicity. Nurses with family history of VVs has higher prevalence of VVs (64.5%) compared to those who did not have family history (35.5%) (Ali et al., 2022).

In another study among female hairdressers in Iran, prevalence of varicose veins was 47.7% among 197 hairdressers, 55 (27.9%) individuals had mild or moderate VVs, and 39 (19.8%) individuals had severe VVs (Ebrahimi et al., 2015). There was no association between BMI and risk of VVs reported (Ebrahimi et al., 2015). However, obesity had been suggested as a risk factor aggravating VVs instead of the primary risk factors (Ebrahimi et al., 2015). According to Ebrahimi et al., (2015), a higher blood pressure was significantly associated with a high prevalence of VVs in lower extremity. Risk of

constipation and increased standing hours at work are also associated with an increased risk of VVs in lower extremity (Ebrahimi et al., 2015). Many studies also shown that prolonged standing or sitting known to be risk factor of VVs (Ebrahimi et al., 2015).

According to Chen & Guo (2014), they reported that their study on prevalence of lower extremity VVs among hairdressers in Taiwan is 24.2% which requires prolonged standing. Chen & Guo (2014) investigated that family history of VVs was risk factor among younger age group (≤45 years old), but not in the older group (>45 years old). A long work history (>30 years) shown a significant risk factor in the older age group (>45 years), but not in the younger age group (≤45 years) (Chen & Guo, 2014).

Due to the high percentage of female nurses who participated in the study in Riyadh, there was a higher frequency of VVs in female nurses (97.5%) than in male nurses (Albader et al., 2020). According to Albader et al., (2020), their study findings also indicated a relationship between VVs and social status, which may be explained by the possibility that marriage may be an unintentional risk factor for VV in women due to multiparity. High numbers of years of working and lifting heavy objects also considered as risk factors for VVs as high pressure in lower extremities leads to valvular incompetency (Albader et al., 2020). Increased years of working and prolonged standing duration at patient's bedside has a high percentage of participants affected with VVs which has concordance from other studies (Albader et al., 2020). However, there was a VVs study from Taiwan which involved physicians

reported that prolonged standing hours do not affect the development of VVs in physicians and non-physicians (Albader et al., 2020). There was a significant association between VVs and family history, but no clear genetic pattern found (Albader et al., 2020). In the study, Albader et al., (2020) reported that there was a high prevalence of VVs in menstruating females occurs in middle-aged group, which related to increased progesterone and estrogen levels. There was no association between diabetes and VVs, as well as hypertension which relates with high blood volume and dilated veins (Albader et al., 2020). According to the studies' results, increasing age, females and prolonged standing were associated with higher chance of developing VVs.

2.3 Definition, symptoms, complications and risk factors of varicose veins (VVs)

VVs is a chronic venous disease which may appear in any part of body, commonly develops in lower extremities where venous return to heart is weak (Ebrahimi et al., 2015). VV of lower extremities are visible, tortuous, and dilated veins of the superficial venous system, typically larger than 3 mm, due to the pooling of blood (Zhang & Melander, 2014). Veins are thin-walled vessels that are easily extended by the chronic pooling of blood in lower extremities. When the vascular wall encounters sustained stretch, the effectiveness of one-way venous valves reduced, lead to valvular incompetence. Consequently, there is a reversal of blood flow and the accumulation of blood in the veins leads to increased prominence and enlargement of veins (Ali et al., 2022).

VVs symptoms can be localized to the afflicted area or widespread in the lower extremity. Some common localized symptoms which are prevalent such as dull aching pain, burning and itching over the affected leg known as stasis dermatitis, visibly dilated veins, discoloured skin above ankles, leg heaviness, weariness, warm leg and oedema (Ebrahimi et al., 2015). Besides, VVs may result in direct complications such as venous insufficiency, thrombophlebitis, and hemorrhage, and indirect complications such as statis ulcers, chronic statis dermatitis, skin pigmentation, lipodermatosclerosis, atrophie blanche and edema (Albader et al., 2020).

According to a study in Saudi Arabia reported by Busbaih et al. (2022), 43.1% of the teachers reported experiencing leg pain while at work which had correspond with another study where 66% of nurses over several hospitals in Lebanon reported experiencing leg pain while at work. Therefore, the most typical varicose vein presentation is pain (Busbaih et al., 2022). Additionally, 28.1% of the patients reported having nocturnal cramps which corresponded with a study on Nepal's traffic police, with a prevalence of nocturnal cramps around 32% (Busbaih et al., 2022). Spider legs-shaped veins on the leg, which make up 23.8% of the symptoms known to be the most prevalent which also corresponded with a study where 26% of the Belagavi city police have spider legs-shaped veins (Busbaih et al., 2022). On the other hand, 17.8% of participants felt swelling in the leg and pain whereas, dilated veins made up 5.5% of the most prevalent signs among Nepal's traffic police (Busbaih et al., 2022). Furthermore, leg scars (11.8%) and a change in skin tone (11.5%) are the third

and fourth most frequent symptoms, respectively (Busbaih et al., 2022). However, itching is the weakest indication among the symptoms (Busbaih et al., 2022).

In relation to risk factors, females are more prone to develop VVs than males, with age above 35 years (Mahmood et al., 2021). Other related factors are white more than blacks, pregnancy, obesity, ascites, menopause, familial tendency, age, prolonged standing, thrombosis of leg veins and abdominal or pelvic pain (Mahmood et al., 2021). According to Canadian Centre for Occupational Health and Safety (CCOHS) (2014), regularly standing while working can lead to a variety of health issues, including aching feet, leg swelling, varicose veins, generalised muscular exhaustion, low back discomfort, stiffness in the neck and shoulders, and more (Waters, 2015). According to the CCOHS report, standing for an extended period of time limits the blood flow to the muscles, which accelerates the development of fatigue. Prolonged standing also causes pain in the neck, back, and leg muscles, as well as blood pooling in the legs and feet, which produces varicose veins (Waters, 2015). Numerous cross-sectional studies have demonstrated an association between obesity and varicose veins for both sexes (Laurikka et al., 2002) or at least for women (Abramson et al., 1981, Sisto et al., 1995, Canonico et al., 1998, Lee et al., 2003, as cited in Athi, 2010). However, the studies in Switzerland (da Silva et al., 1974), Turkey (Komsuoglu et al., 1994), France (Carpentier et al., 2004) and Germany (Kroeger et al., 2004) did not find an obvious association between obesity and the prevalence of varicose veins in either sex, neither did the two studies in Switzerland and Japan including only female subjects

(Guberan et al., 1973, Hirai et al., 1990). The number of hours spent each day doing inactive, mild, moderate, and heavy tasks was used to measure physical activity in the Framingham Study (Brand et al., 1988). When compared to those without varicose veins, those with them had decreased levels of exercise (Athi, 2010). Another research in the former Czechoslovakia found that women were more likely than men to have varicose veins of any type (Athi, 2010). Those who engaged in physical activity at least once a week had lower prevalence than those who did not, although the difference was not statistically significant, however the study did not mention "physical exercise" (Athi, 2010). According to the lifting guidelines suggested by the Revised NIOSH Lifting Equation (Niosh, 2006), under ideal circumstances, a person can lift 51 pounds (23kg) of weight with two hands. Muscles, tendons, ligaments, nerves, and blood vessels may be damaged in addition to other body parts (Niosh, 2006).

According to Ducimetiere et al. (1981) as cited in Athi (2010), According to a cross-sectional French study, males who smoked had more varicose veins than men who did not smoke. Lower limb venous insufficiency was found to be significantly related with tobacco smoking with dosage effect relation in both genders in a case-control study (n=3,612) conducted in France (Athi, 2010). The majority of the other research found no connection between smoking and varicose veins (Malhotra 1972, Abramson et al. 1981, Hirai et al., 1990, Franks et al., 1992, Lee et al., 2003, Carpentier et al., 2004, Komsuoglu et al., 2004, as cited in Athi, 2010).

The Tampere Varicose Vein Study discovered an association between varicose veins, vascular dysfunction, and congestive heart failure (Mäkivaara et al., 2008, as cited in Athi, 2010). The relationship between varicose veins and deep venous thrombosis also exists, though it is unclear in which aspect (Athi, 2010). Deep venous thrombosis dilates the vein in response to proximal venous restriction and induces valvular incompetence and reflux which could contribute to VVs (Killewich et al., 1989, as cited in Athi, 2010).

2.4 Aetiology and Pathophysiology of Varicose Veins

VVs can be caused by either primary or secondary disease. In primary venous disease, congenital or morphological abnormality is the most common cause of varicose veins as a result of weak mesenchymal tissue (Gloviczki, et al., as cited in Zhang & Melander, 2014). One of the important risk factors of varicose veins is prolonged period of standing, that lead to intrinsic morphologic abnormality and progressive dilation of superficial veins of lower extremity (Zhang & Melander, 2014). An increased of venous pressure in lower extremity occurs when there is a long period of standing hours, resulting from an increase of hydrostatic pressure while standing (Matfin, et al., as cited in Zhang & Melander, 2014). In addition to this, without the aid of calf muscles to pump blood back to the heart, the veins get stressed and incompetent over time (Zhang & Melander, 2014). Consequently, the veins become progressively dilated and elastic, leads to valvular incompetence (Zhang & Melander, 2014). Secondary venous disease normally caused by increased intra-abdominal pressure or increased pressure in superficial or deep

venous system such as deep vein thrombosis, deep venous obstructions, superficial thrombophlebitis, congenital or acquired arteriovenous fistulas, and pregnancy or from a tumour (Zhang & Melander, 2014). Most common cause of secondary venous disease is deep vein thrombosis, when an obstruction occurs on deep veins, it leads to increasingly high pressure, as a result, progressive dilation in superficial veins leads to varicose veins (Zhang & Melander, 2014).

Chronic venous insufficiency frequently manifests as VVs. Venous hypertension, reflux, dysfunctional valves, and dilated vein walls are the four common signs of VVs (Athi, 2010). According to Raffetto and Khalil (2008), the primary structural changes in the valves may initiate the pathophysiological process of varicose veins through progressive reflux to the secondary changes in the vein wall, as cited in Athi (2010). Alternatively, or concurrently, the valves may become ineffective due to abnormalities in the vein wall close to the valve junctions that predispose to venous dilation and cause the reflux (Cooper et al., 2003, Elsharawy et al., 2007, Raffetto & Khalil 2008, as cited in Athi, 2020). According to Athi (2010), Recent research has provided evidence on various causes for the vein wall's weakness which includes endothelial cell dysfunction (Somers & Knaapen, 2006, Raffetto & Khalil, 2008), smooth muscle cells and extracellular matrix alterations (collagen, elastin, proteoglycans, and glycoproteins) (Travers et al., 1996, Wali et al., 2002, Elsharawy et al., 2007), chronic inflammation (Raffetto & Khalil, 2008) and anomalies in matrix metalloproteinase (MMPs) content and activity (Gillespie

et al., 2002, Kowalewski et al., 2004, Hobeika et al., 2007) and their tissue inhibitors (TIMPs) (Raffetto & Khalil, 2008).

2.5 Diagnostic testing

Trendelenburg testing may be used to evaluate the superficial venous system and to assess the severity of VVs. The patient is positioned in supine lying, and the affected lower extremity is elevated above heart level (Zhang & Melander, 2014). A tourniquet is tied around the upper thigh of the patient's affected leg to occlude the greater saphenous vein, and the blood from the venous system able to drain while the leg remains elevated (Zhang & Melander, 2014). Then patient will be in standing position and observe the venous refilling of the affected lower extremity. Without removing the tourniquet, within 30 seconds of superficial saphenous vein refilling indicates a competent venous system which is a normal result (Zhang & Melander, 2014). If there is rapid refilling of the superficial veins less than 30 seconds with the tourniquet in place indicates valvular incompetence below the level of tourniquet in deep veins. If there is no rapid filling within 20 seconds, remove the tourniquet. If there is sudden filling, it indicates incompetence of the superficial veins, an abnormal test results that indicate the presence of varicose veins (Zhang & Melander, 2014).

Duplex ultrasound scanning is a non-invasive, reliable, and cost-effective test which able to assess venous obstructions, turbulence, and the direction of the venous blood flow. This test is a gold standard and primary

option to assess suspected VVs in lower extremities (Zhang & Melander, 2014). Another diagnostic test is venography which injection of contrast media into the venous system to find the exact locations of the obstructed veins (Zhang & Melander, 2014).

2.6 Medical treatment of varicose veins

A non-surgical treatment which is sclerotherapy involves injection of chemical either liquid or foamed into the abnormal veins to destroy the endothelium and induce fibrotic obstruction of vein (Zhang & Melander, 2014). Common sclerotherapy agents used are sodium tetradecyl sulfate and polidocanol (Zhang & Melander, 2014). Even though there was study found that sclerotherapy shows better short-term outcomes and decreased pain with fast recovery period, the recurrence rate as high as 64% at the 5-year follow up was reported in another recent study (Zhang & Melander, 2014). Surgical treatment involves removal of affected veins which consist of different operation method depends on which veins needed to be treated (Compression Stockings for Prevention of Varicose Veins and Deep Vein Thrombosis among nurses Health Technology Assessment Section Medical Development Division Ministry of Health Malaysia., 2008). Ligation and stripping is the most common method, where the affected vein is ligated at top of leg, and a flexible wire is inserted through the affected vein and attached to one end by pulling the wire back, stripping out the vein (Compression Stockings for Prevention of Varicose Veins and Deep Vein Thrombosis among nurses Health Technology Assessment Section Medical Development Division Ministry of Health

Malaysia., 2008). Besides, endovenous LASER ablation used to treat affected veins by using laser light to generate thermal energy and occlude the vein by delivering the thermal energy, resulting in endothelium destruction and fibrotic occlusion (Zhang & Melander, 2014). Studies reported there was absence of reflux between 77 & to 100% for endovenous LASER ablation (Zhang & Melander, 2014).

2.7 Physiotherapy management in Varicose Veins

Conservative management can be used to manage and prevent symptoms among patients with varicose veins, combination with lifestyle modification. The role of physiotherapist in patient's education is essential to help patients to understand the importance of lifestyle modification. Patient's education can be taught to patients themselves or caregivers. A daily skin care is recommended by using mild soap and lukewarm water followed by petrolatum-based moisturizer (Zhang & Melander, 2014). A constrictive clothing such as knee-high or panty hose stockings should be avoided to prevent restriction of blood flow to the lower extremities and no crossing legs (Zhang & Melander, 2014). Physiotherapist should also educate the need of keeping the legs elevated at rest to promote venous return back to heart about 30 minutes 4 times daily (Zhang & Melander, 2014). Patients are strictly not allowed to have legs in dependent position or standing for prolonged period of time to prevent pooling of blood in the lower extremities (Zhang & Melander, 2014). Physiotherapy can educate the patient on different types of leg exercises which can help to promote return of blood back to heart with the aid of calf

muscles (Zhang & Melander, 2014). A regular walking exercise using treadmill with slight inclination if possible, where patient should stop if pain elicited (Zhang & Melander, 2014). Heel raise exercise which patient is standing and rise up the heel on the tips of the toes while holding onto a bar or any support and return to starting position for 20 repetition, 3 sets with 30 seconds rest between the sets, 3-5 times per week (Zhang & Melander, 2014). Ankle pumps which dorsiflexion and plantarflexion of feet can be done in sitting with similar frequency with heel raise exercise. Maintaining ideal body weight may also prevent from varicose veins. Compression therapy is the first-line treatment and commonly used to treat varicose veins and its associated complication such as venous edema, skin changes and ulcerations (Zhang & Melander, 2014). Patient may use compression stockings which is effective in managing varicose symptoms including pain, skin hyperpigmentation and edema. Patients are also educated on the use of stockings by removing the stockings once every 8 hours for 30 minutes and importance of wearing stockings during waking hours (Zhang & Melander, 2014). A careful assessment of compression stocking is needed to get the correct size and is recommended to have a knee-high stockings for patients with simple varicose veins and to be prescribed by proper trained professions (Zhang & Melander, 2014). However, patients with several peripheral arterial occlusive disease, massive leg oedema or pulmonary oedema due to heart failure and extreme leg deformity are contraindicated for compression stockings. Varicose veins may be treated with a variety of drugs (Jones & Carek, 2008). In randomised, double-blind, placebo-controlled trials, horse chestnut seed extract (Aesculus hippocastanum) has been proven to reduce edema (Jones & Carek, 2008). There is still lacking of medical literature

to support the use of diuretics (Jones & Carek, 2008). Although butcher's broom (Ruscus aculeatus) has also been used as drug, there is a lack of clinical evidence supporting its efficacy and safety (Jones & Carek, 2008).

In conclusion, avoiding extended standing and strain, raising the affected leg, exercising, applying compressive pressure, removing constricting garments, receiving medical therapy, modifying cardiovascular risk factors, reducing peripheral oedema, and losing weight are examples of conservative treatments (Jones & Carek, 2008). The initial treatment for varicose veins has been suggested using external compression devices, such as bandages, support stockings, and intermittent pneumatic compression devices, although there is insufficient data to back up these recommendations (Jones & Carek, 2008). Wearing elastic compression stockings with a pressure gradient that decreases from the distal to proximal extremity is typically advised (Jones & Carek, 2008).

CHAPTER 3

MATERIALS AND METHODOLOGY

3.1 Chapter overview

This chapter will outline the research methodology used, highlighting the study design, study settings, study population, sample size, sampling method, inclusion and exclusion criteria, instrumentation, procedure, statistical analysis and ethical approval in detail.

3.2 Study Design

The study design for this study utilized descriptive cross-sectional study. The data collection period was from November 2022 to December 2022, where the online survey form is distributed via social media platforms.

3.3 Study Setting

The study was conducted within the area of Cheras which fast food restaurants and vendors are located. The study utilized social media platforms which includes Whatsapp, Facebook, Instagram and email to recruit participants for online survey which the questionnaire is prepared via Google Form.

3.4 Sample Size

Sample size was calculated using Krejcie and Morgan (1970) Table (Appendix D). An approximated number of fast food workers in Cheras was found to be 380 which determined the sample size for the study to be 191 with an additional 19 people to account for the 10% dropout rate resulting in a final sample size to be 210.

3.5 Population

Target population is fast food workers who work in fast-food restaurants and vendors in Cheras, Selangor.

3.6 Sampling Method

Convenience sampling method is used. Data collection of fast-food workers in Cheras, Selangor is facilitated in a short period of time and able to easily reach out by distribution of online questionnaires via QR scan or social medias.

3.7 Inclusion Criteria

- Able to read and understand English (Shah & Sheth, 2018)
- Fast-food workers who work at fast-food restaurants and vendors in Cheras, Selangor.
- No history of lower extremity venous disease before working as fast-food employee (Ebrahimi, et al., 2015).

3.8 Exclusion Criteria

- Pregnant women (Albader, et al., 2020)

3.9 Instrumentation

A validated questionnaire is adopted by requesting from corresponding author, Bader Albader, who published the research topic on 'Prevalence of Varicose Veins Among Nurses at Different Departments in a Single Tertiary Care Center in Riyadh'. However, three-quarters of the adopted questionnaire has been changed. Modifications are made upon the questionnaire and validated by lecturers from UTAR, Department of Physiotherapy, Faculty of Health Sciences. The self-reporting questionnaire consists of 4 sections: (1) Demographic data, (2) Work-related variables, (3) Lifestyle, (4) Health-related variables. The questionnaire can be referred to as Appendix E. Further details of questionnaire will be elaborated as below in subtitles of 3.9.1 to 3.9.4. Screening tool is the eligibility criteria screening to ensure participants does

not have the following exclusion criteria: - Pregnant women (Albader, et al., 2020) as focuses on both female and male participants. The questionnaire has been validated and given comments on each component by 5 of the UTAR lecturers from Department of Physiotherapy, Faculty of Health Sciences.

The scale for validity evaluation has 5 ratings, which are 5 (very high valid), 4 (high valid), 3 (valid), 2 (less valid) and 1 (not valid at all). The validation marking scheme can be referred in Appendix F for all 9 indicators. The average score for validation of questionnaire for this study according to each indicator is calculated. First indicator is with an average score of 4 (high valid). Second indicator is with an average score of 4 (high valid). Third indicator is with an average score of 4.4 (high valid). Fourth indicator is with an average score of 4.2 (high valid). Fifth indicator is with an average score of 3.8 (valid). Sixth indicator is with an average score of 4.2 (high valid). Seventh indicator is with an average score of 4.6 (high valid). Eight indicator is with an average score of 3.8 (valid). Lastly, the nineth indicator is with an average score of 4 (high valid). Thus, the sum of average score of all 9 indicators is 37 out of 45, hence, the questionnaire is valid.

Informed consent form is also provided to the participants, this form is to inform them regarding the purpose of this study and how this research will be carry out. Personal data protection (PDP) letter is also attached inside, this is to protect the participants information and avoid any leak of their personal data.

3.9.1 Social demographic data

In the first section of the questionnaire, which is the social demographic data. This section of the questionnaire collects data including name (optional), age categorised into ’16 - 20’, ‘21 – 25’, ‘26 – 30’, ’31 - 35’, ’36 - 40’, ’41 - 45’, ’46 - 50’, ’51 - 55’, ’56 - 60’ and ‘> 60’, gender categorised into ‘male’ and ‘female’, height in cm, weight in kg, ethnicity categorised into ‘Malay’, ‘Chinese’, ‘Indian’ and ‘Others’, social status categorised into ‘single’, ‘married’, ‘widow/widower’ and ‘divorcee’, job position and years of working. Height and weight will be calculated into body mass index (BMI) in kg per m^2 and to be categorised into ‘Underweight’, ‘Normal’, ‘Overweight’ and ‘Obesity’ during data analysis. All questions are required to be answered. All heights and weights of participants will be calculated into BMI and categorised into different level.

3.9.2 Work related

For the second section of the questionnaire, it consists of 6 questions that requires participants to report on their working status. Meaning of “shift” is defined as “work time/shift work”. This section only consists of close ended questions, which is a multiple choices question. In first question, participants are asked for their working shifts per day, categorised into ‘1’, ‘2’ or ‘3’ shifts. Second question is working days per week, categorised into ‘1 – 2’, ‘3 – 4’, ‘5 – 6’ or ‘7’. Third question is hours of standing per working day categorised

into ‘< 1’, ‘1 – 2’, ‘2 – 4’, ‘4 – 6’, ‘6 – 9’ or ‘> 9’. Fourth question is hours of sitting per working day categorised into ‘< 1’, ‘1 – 2’, ‘2 – 4’, ‘4 – 6’, ‘6 – 9’ or ‘> 9’. Fifth question about weights lifted in kg or L during worktime is categorised into ‘None’, ‘< 5’, ‘5 – 10’, ‘10 – 15’, ‘15 – 20’, ‘20 – 23’, ‘> 23’. Sixth question is any external mechanical devices or assistance are used if participants do carry weights, either ‘Yes’ or ‘No’. Participants can skip sixth question if answer to fifth question is ‘None’.

3.9.3 Lifestyle related

Third section consists of 4 questions which are related to lifestyle. Meaning of phrases are defined at the most bottom of the section. First question is related to smoking or vaping habit, which categorised into current smoker or vaper, ex-smoker or vaper and non-smoker or vaper. Second question is frequency of practicing sports or physical exercise, which categorised into ‘None’, ‘< 4 times per week’ and ‘> 7 times per week’. Third question is the use of tight stockings during activity, either ‘Yes’ or ‘No’. Fourth question is continued as if the answer from third question is ‘yes’

3.9.4 Health related

This fourth section is subdivided into four parts. First part is on being diagnosed with varicose veins since working as fast food worker, either ‘Yes’ or ‘No’. If answer is ‘Yes’, participant will continue with second part,

otherwise skipped to third part. Second part consists of 4 questions. First question is presence of varicose veins in ‘one’ or ‘both’ lower legs. Lower legs indicated as calf, ankle or foot. Second question is asked if participant received any medical treatment of varicose veins, either ‘Yes’ or ‘No’. If answer is ‘Yes’, participant is asked on types of medical treatment received, where multiple answer can be chosen includes ‘Sclerotherapy’, ‘Ligation and stripping’, ‘Endovenous LASER ablation’, ‘Medications’, ‘Physiotherapy’ and ‘Other’. For the following question, participants are asked on any recurrence of varicose veins after underwent any surgery, either ‘Yes’ or ‘No’, if only they underwent surgery. Third part is answered by participants who are not diagnosed with varicose veins, related on presence of signs and symptoms of varicose veins. This part consists of 4 statements which are dilated worm-like appearance in dark blue purple colour in calf, ankle or foot, feel bad and continuous pain and swelling in calf, ankle or foot, experiences worsened pain over calf, ankle or foot after standing for more than 4 hours a day, and itching and burning sensation around the worm-like appearance in calf, ankle or foot. All answers are ‘Yes’ or ‘No’ to the statements. Lastly, the fourth part of this section consist of 9 questions. This part is to identify whether the comorbidities are risk factor of varicose veins which are required to be answered by all participants. Meaning of medical terms are listed at the most bottom of the questions. First question is asked on family history of varicose veins. Second question is asked on the diagnosis of deep vein thrombosis (DVT). Third question is asked on the diagnosis of coronary artery disease (CAD). Fourth question is asked on presence of high blood pressure with a range of equal to or more than 130/80 mmHg. Fifth question is any experience of infrequent bowel

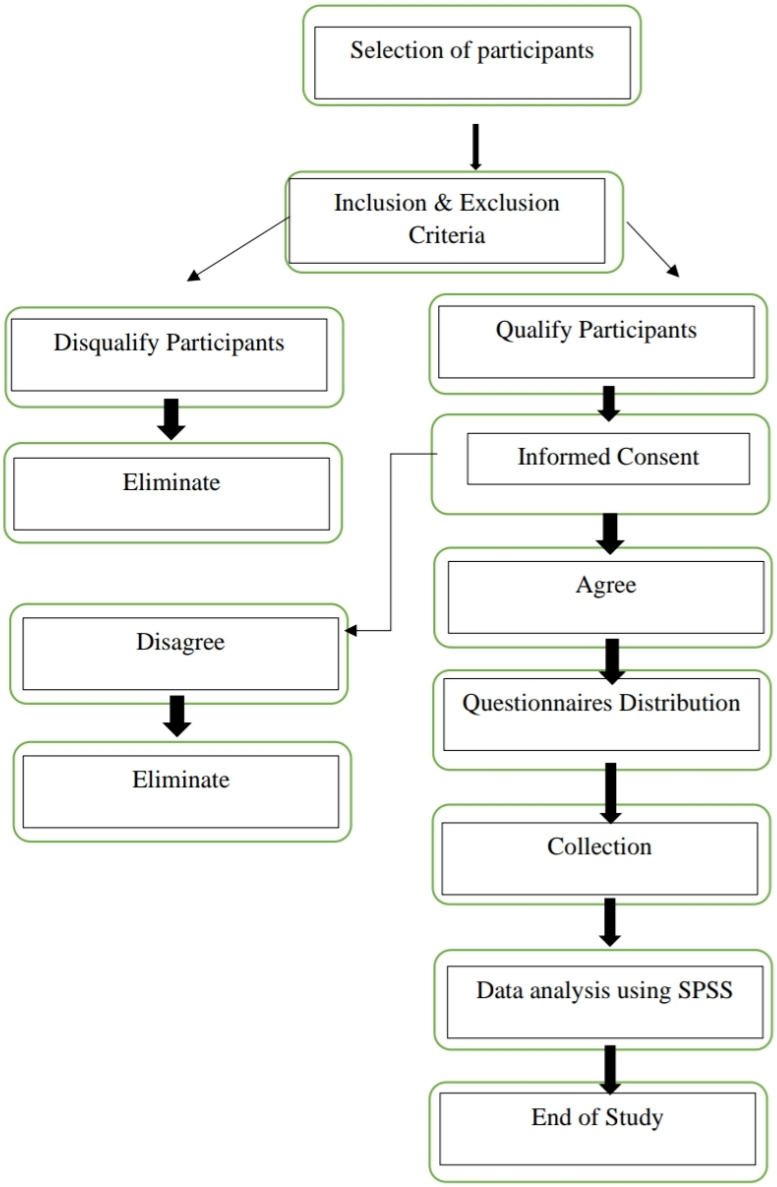
movement or difficult passage of stools that persists for weeks at a time. Sixth question is presence of diabetes. Seventh question is on kidney disease and eighth question is on the diagnosis of rheumatoid arthritis. Lastly, the ninth question is on any history of leg trauma with example of sprains, strains, fractures or joint dislocation. All answers are closed ended which is 'Yes' or 'No' to the questions.

3.10 Procedure

After formulation and validation of questionnaire is done, the ethical approval is obtained from UTAR Scientific and Ethical Review Committee (SERC) (APPENDIX A), M. Kandiah Faculty of Medicine and Health Science. Participants were recruited from fast-food restaurants or vendors in Cheras area via social media platforms (facebook, whatsapp, instagram, etc.) and disseminating the online questionnaire via Google Form link or QR code. Information of the study will be briefed to the participants. Participants are required to fill in the consent form to prove that their involvement is voluntary and assured that they have the right to refuse and withdraw from the study at any time. Participants are required to accept the terms and conditions of study before answering the questionnaire. Participants are screened for their eligibility. Participants are required to fill in the questionnaire containing personal data protection statement (APPENDIX C), and informed consent form (APPENDIX B). The questionnaire includes demographic data, work-related variables, lifestyle and health related variables (APPENDIX E) are distributed together with the consent form and agreements. The Questionnaire required

only approximately 5 to 10 minutes upon completion. Collection of data from participants by achieving sufficient responses and proceed to analysis of data. Data analysis is conducted in order to identify the prevalence of varicose veins among fast food workers and its associated risk factors in Cheras, Selangor.

3.11 Flowchart



3.12 Statistical Analysis

Data collected will be computed and analysed using IBM Statistical Package for the Social Science (SPSS) version 26.0 and Microsoft Excel to produce study findings. Descriptive statistic will be used to analyse the demographic data such as age, gender, level of body weight (classified according to BMI), ethnicity, social status and others reported as categorical variables: frequency (n) and percentage (%); and quantitative variables: years of working were described as mean±SD (standard deviation). Significance level will be set at $p<0.05$ while confidence level set at 95%. Chi-square test ($\chi 2$) or Fisher's exact test will be used to find the association between the outcome and any categorical variable. Univariate descriptive analysis will be used to find the association between the outcome and years of working experiences.

3.13 Ethical Approval

In the study, it is ethically approved by the ethical approval from Scientific and Ethical Review Committee (SERC) of Universiti Tunku Abdul Rahman (UTAR). An ethical approval letter was provided after the approval and it was attached in Appendix A. The informed consent form containing the introduction of the research was also attached in Appendix B. The principle of the ethical during research includes informed consent of the subject, minimise the risk of harm to subjects, protect the anonymity and confidentiality, avoid

using deceptive practices and give participants the right to withdraw the research. Any information about the survey will be explained in the language which the subject will understand. Assured subjects participate in voluntary nature in this survey. The subjects have given their consent by filling a form with guaranteed confidentiality, shall not be disclosed without their prior consent.

Personal Data Protection Statement includes acknowledgement of notice regarding informed consent will be included as signature for declaration of consent which has attached in Appendix C. There are no harmful effects and benefits to the participants. Data confidentiality statements will be included. The information and of participants will be kept confidential and all associated data collected will be immediately destroyed wherever possible.

3.14 STROBE Checklist

This study followed Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist in order to carry out an observational and cross sectional study.

CHAPTER 4

RESULTS

4.1 Chapter overview

The following chapter features the findings after the data collection process for the research project. Firstly, demographic data of the participants is presented followed by work related variables, proceed next to lifestyle variables and health related variables. The results are being presented in the sequence of the tabulation first, if any, followed by a brief description and the relevant graphs.

4.2 Demographic data of the participants

This subsection highlights the demographic data of the participants in form of table summarizing the overall subsection, graphs and its descriptions.

Demographic data	**Frequency (%)**	**Mean (Std Dev)**
N	201(100)	
Age Group		
16-20	39 (19.4)	
21-30	74 (36.8)	
31-40	45 (22.4)	
41-50	17 (8.5)	
51-60	15 (7.5)	
>60	11 (5.5)	
Gender		
Male	117 (58.2)	
Female	84 (41.8)	
Ethnicity		
Malay	54 (26.9)	
Chinese	114 (56.7)	
Indian	25 (12.4)	
Kadazan Dusun	5 (2.5)	
Myanmar	3 (1.5)	
Social status		
Single	138 (68.7)	
Married	63 (31.3)	
Level of body weight (classified according to BMI)		
Underweight (<=18.5)	19 (9.5)	
Normal (<=24.9)	128 (63.7)	
Overweight (<=29.9)	36 (17.9)	
Obesity (>30)	18 (9.0)	
Job position		
Barista	29 (14.4)	
Store Manager	14 (7.0)	
Food Vendors	21 (10.4)	
Service Crew	48 (23.9)	
Kitchen Crew	89 (44.3)	

Years of working experiences	4.87 (6.43)

Note: N = total number of participants, BMI = Body Mass Index

Table 4.2: Demographic data of the participants

From the Table 4.2 above, it shows the frequency and percentage of the age group, gender, ethnicity, social status, level of body weight classified according to BMI, job position and years of working in fast food industry of all participants in this study. The author successfully collected 213 responses for this study. Among the total of the 213 responses collected, there were 9 participants does not match the inclusion criteria as fast food workers and 3 participants given data that does not tally. These data were removed from data analysis process. Thus, only remaining 201 of the responses were processed in the SPSS 26.0 version software in the final stage for data analysis in the study and current study achieved response rate of 100%.

4.2.1 Age group

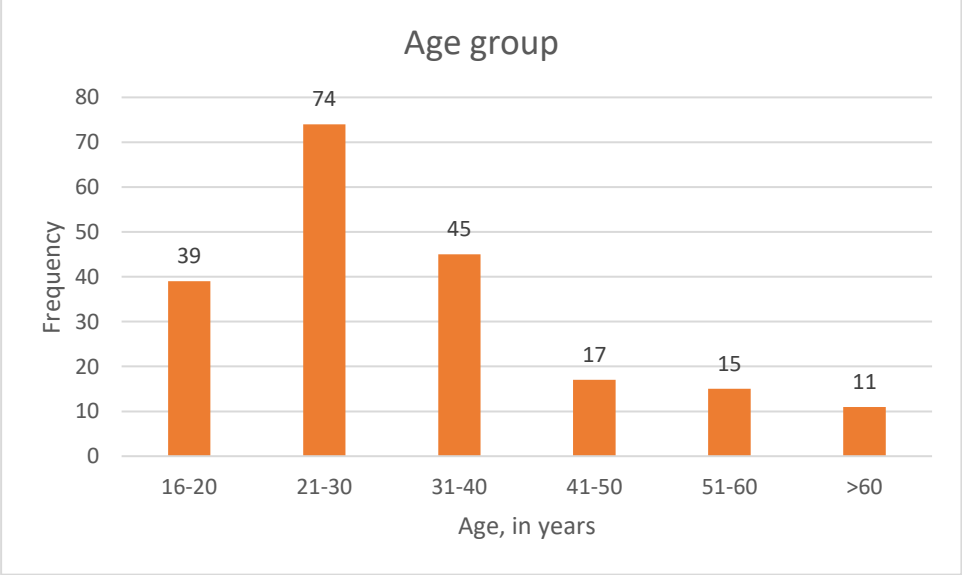


Figure 4.2.1 Bar chart distribution of age group of participants

Figure 4.2.1 above illustrates vertical bar chart age group (in years) distribution of the fast food workers involved in this study. The youngest age group of our participants is from 16 to 20 years old which makes up 19.4% with 39 people. There are 36.8% with 74 of participants which age group from 21 to 30 years old were the highest among the total of fast food workers recruited. Age group from 31 to 40 years old consists of 45 participants or 22.4%, age group from 41 to 50 years old consists of 17 participants which makes up 8.5% and age ranged from 51 to 60 years old makes up 7.5% with 15 participants. Age above 60 years old which is the oldest age group has the least which makes up 5.5% with 11 participants (Table 4.2).

4.2.2 Gender

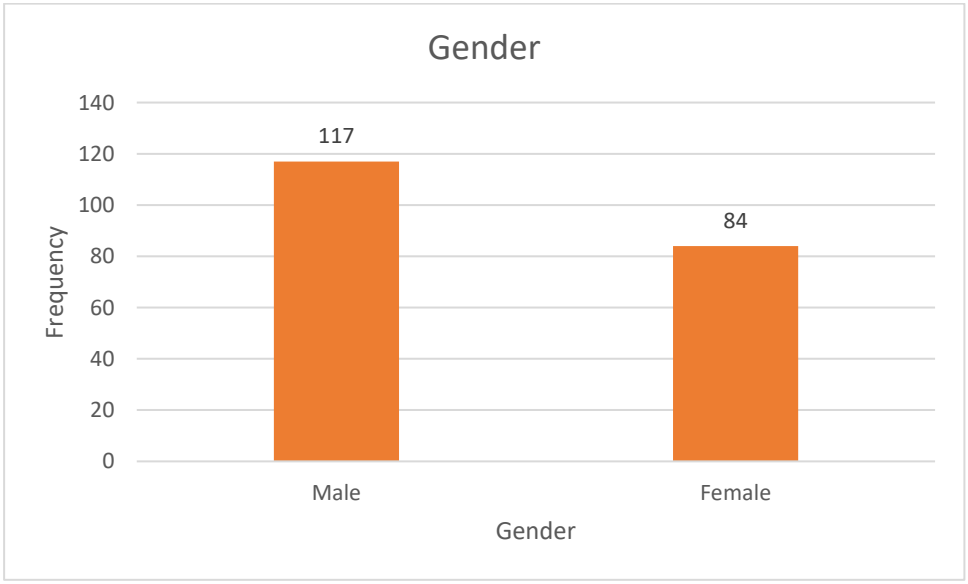


Figure 4.2.2: Bar chart distribution of gender of participants.

Figure 4.2.2 displays the gender distribution of the current study in a vertical bar chart. As illustrated by the bar chart, there are 117 male fast food

workers recruited which is 58.2%, and 84 female fast food workers which are the other 41.8% of the participant pool (Table 4.2).

4.2.3 Ethnicity

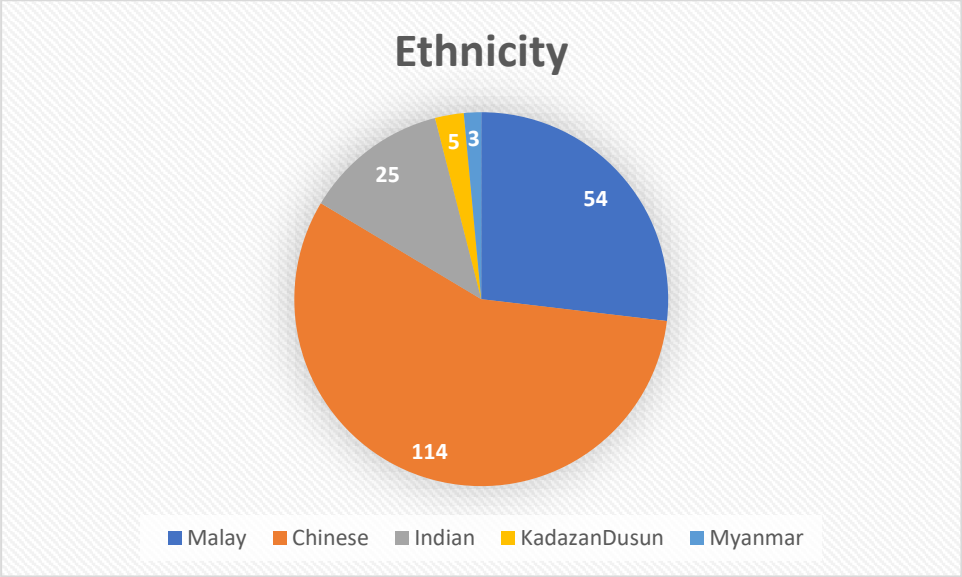


Figure 4.2.3: Pie chart distribution of ethnicity of participants.

The ethnicity distribution of the participants in the pie chart is demonstrated by Figure 4.2.3 and it is evident that the majority of the participants are Chinese which makes up 56.7% of the sample with 114 fast food workers recruited. Malay fast food workers are second in frequency with 54 participants or 26.9% and Indian with 25 participants representing 12.4%. The other ethnicities are Kadazan Dusun which makes up 2.5% with 5 participants, followed by Myanmar which makes up the final 1.5% with 3 participants (Table 4.2).

4.2.4 Social status

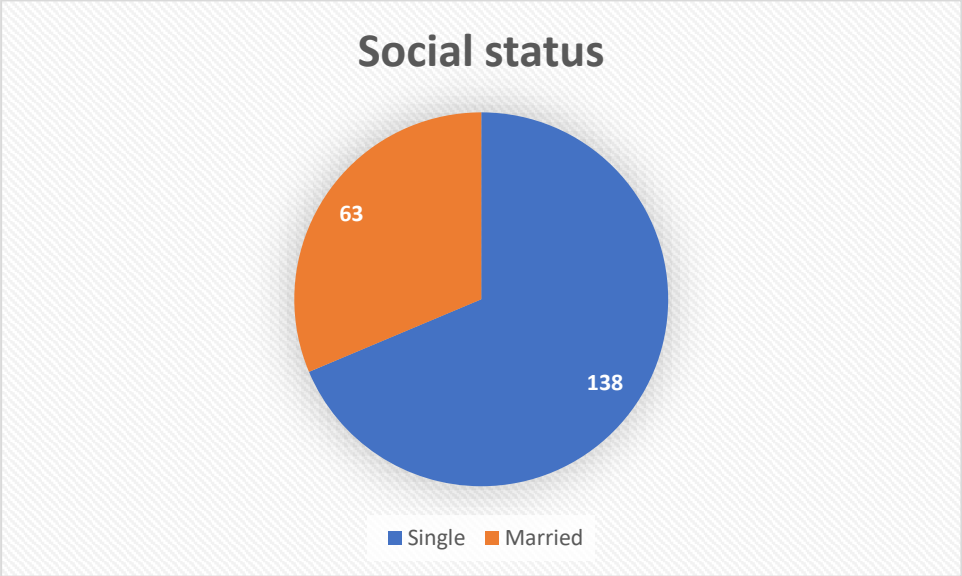


Figure 4.2.4: Pie chart distribution of social status of participants

The pie chart in Figure 4.2.4 shows the distribution of social status of participants. It is evident that the majority of the participants are single status which makes up 68.7% of the sample with 138 fast food workers recruited. However, the remaining 31.3% representing married status with 63 fast food workers recruited (Table 4.2).

4.2.5 Level of body weight (classified according to BMI)

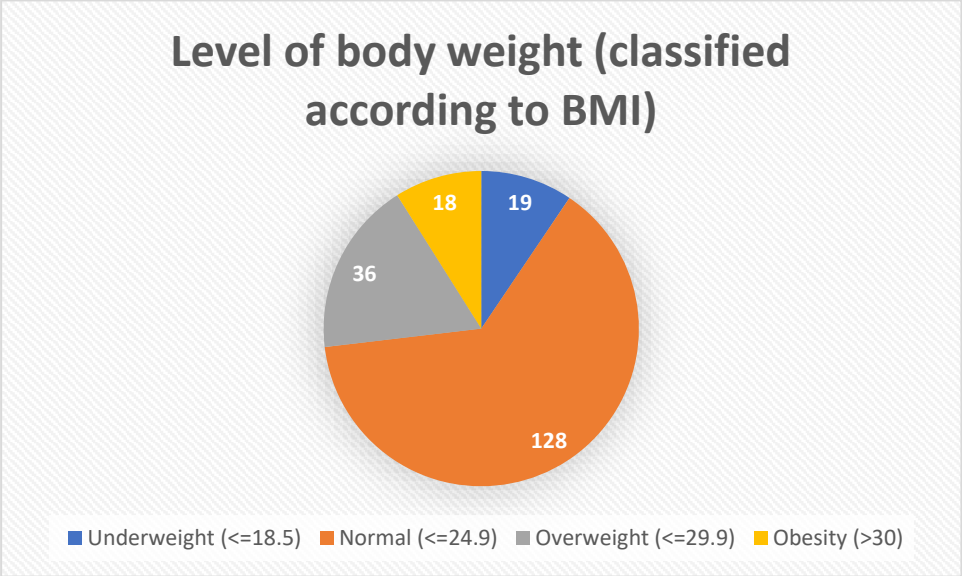


Figure 4.2.5: Pie chart distribution of level of body weight (classified according to BMI) of participants.

According to the pie chart distribution of level of body weight (classified according to BMI) of participants in Figure 4.2.5, majority of the fast food workers are categorised in normal level of body weight where the BMI is at or less than 24.9 kg/m^2, with a frequency of 128 participants which represented by 63.7%. There is a frequency of 36 fast food workers which represented by 17.9% are categorised in overweight, which is at or less than 29.9 kg/m^2. With 19 participants, 9.5% of fast food employees who are considered underweight—defined as 18.5 kg/m2 or less—are underweight. Finally, 18 percent of fast food employees are obese, making up the final 9%. (Table 4.2).

4.2.6 Job position

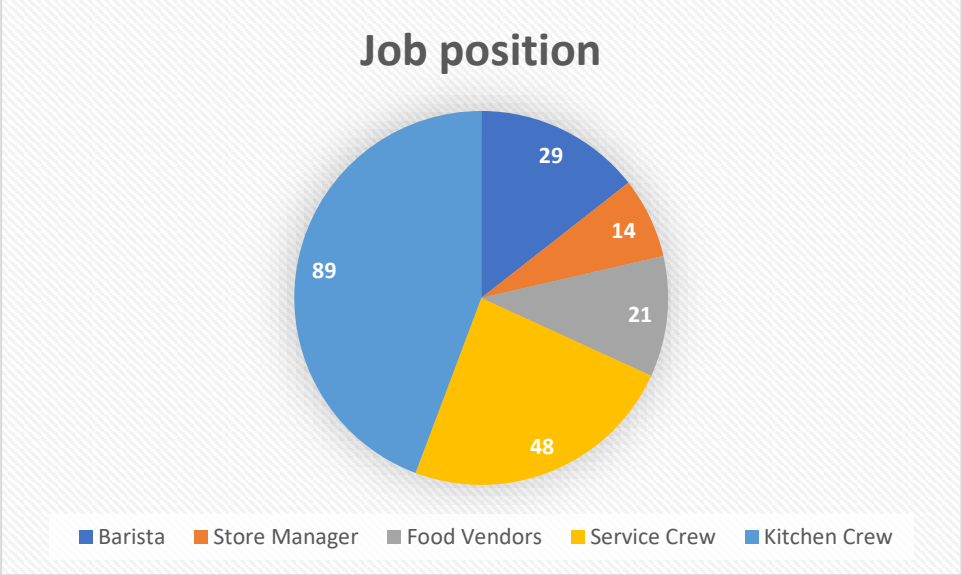


Figure 4.2.6: Pie chart distribution of job position of participants.

The pie chart above shows the distribution of job position of participants in Figure 4.2.6. Among the job positions, it is evident that the majority of the participants are working as kitchen crew which makes up 44.3% of the sample with 89 fast food workers recruited. Service crew job position are second in frequency with 48 participants or 23.9% and Barista is the third with 29 participants representing 14.4%. The other job positions are food vendors which makes up 10.4% with 21 participants, followed by store manager which makes up the final 7% with 14 participants (Table 4.2).

4.2.7 Years of working experience

Figure 4.2.7 Frequency distribution of years of working as fast food worker in a histogram.

The histogram graph above in Figure 4.2.7 shows the frequency distribution of years of working as fast food worker. Total number of 201 participants has reported on their number of years working as a fast food worker. The range of years of working experience among the recruited fast food workers is 0.1 to 40.0 years. The mean value and standard deviation of years of working experience of the total number of fast food workers is 4.87 (6.43). The mode of years of working experience of fast food workers is 3.0 years. The graph is positively skewed.

4.3 Working related data of the participants

This subsection highlights the working related data of the participants in form of table summarizing the overall subsection, graphs and its descriptions.

Work related	**Frequency (%)**
N	201 (100)
Shifts per day (1 shift= 8 hrs)	
1	110 (54.7)
2	90 (44.8)
3	1 (0.5)
Working day per week	
1-2 days	24 (11.9)
3-4 days	26 (12.9)
5-6 days	129 (64.2)
7 days	22 (10.9)
Hours of standing per working day	
< 1	2 (1.0)
1-2	5 (2.5)
2-4	11 (5.5)
4-6	15 (7.5)
6-9	97 (48.3)
> 9	71 (35.3)
Hours of sitting per working day	
< 1	107 (53.2)
1-2	73 (36.3)
2-4	12 (6.0)
4-6	5 (2.5)
6-9	3 (1.5)
> 9	1 (0.5)
Weights lifted (in kg)	
None	7 (3.3)
< 5	36 (17.1)
5-10	43 (20.5)
10-15	27 (12.9)
15-20	18 (8.6)
20-23	37 (17.6)
> 23	42 (20.0)

Note: N = total number of participants
Table 4.3: Work related data of participants

4.3.1 Numbers of working shift per day

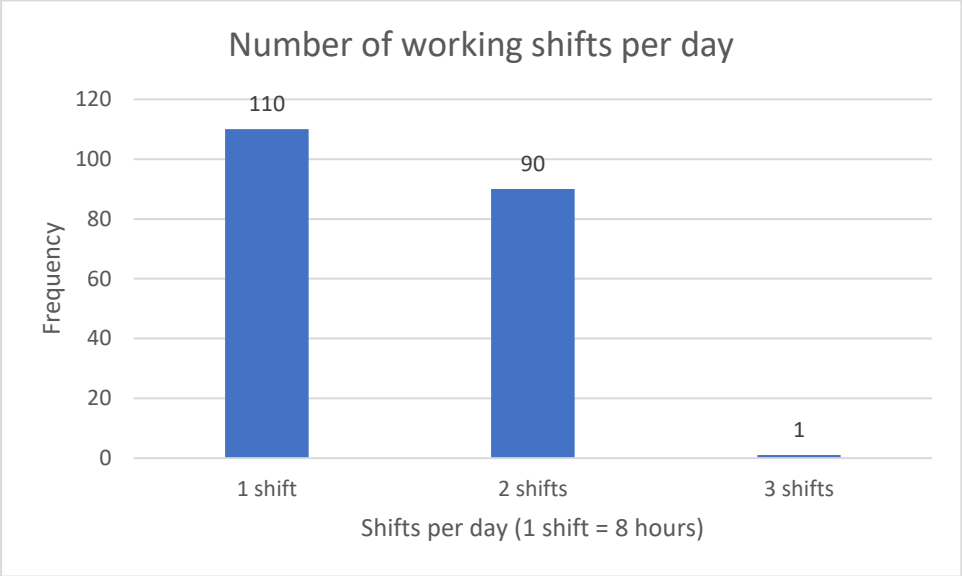


Figure 4.3.1: Bar chart distribution of number of working shifts per day of participants.

The vertical bar chart above showing the distribution of number of working shifts per day of participants in Figure 4.3.1. It is evident that the majority of the participants are working with 1 shift per day which makes up 54.7% of the sample with 110 fast food workers recruited. Fast food workers having 2 shifts per day are second in frequency with 90 participants or 44.8% and followed by 3 shifts per day which makes up the final 0.5% with only 1 participant (Table 4.3).

4.3.2 Number of working days per week

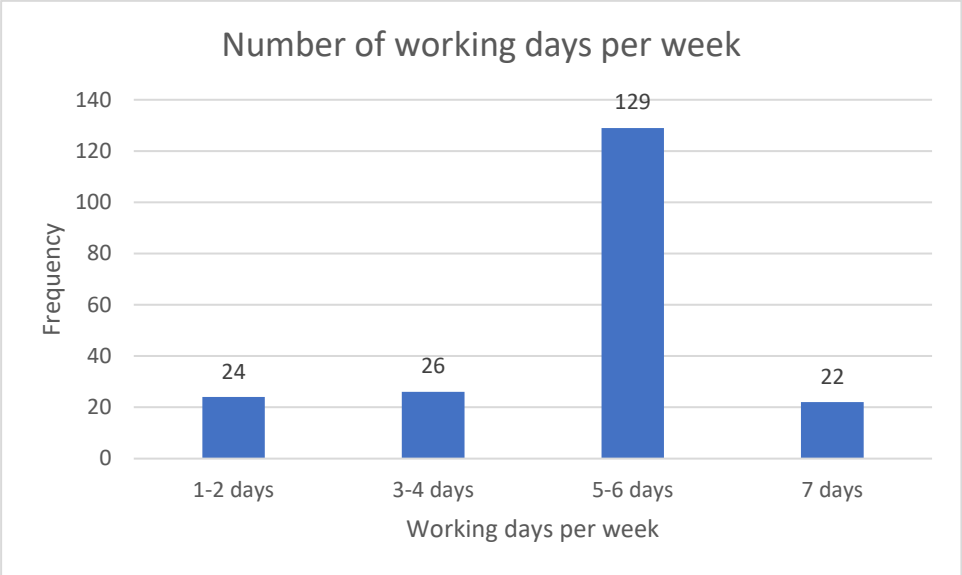


Figure 4.3.2: Bar chart distribution of number of working days per week of participants.

Figure 4.3.2 above illustrates vertical bar chart distribution of number of working days per week of fast food workers involved in this study. The majority of the fast food workers having 5 to 6 working days per week which makes up 64.2% with 129 of participants. There are 11.9% with 24 of participants which have 1 to 2 working days per week. Fast food workers with 3 to 4 working days per week have a frequency of 26 participants or 12.9%. Lastly, there are 22 participants which makes up 5.5% are having 7 days of work per week (Table 4.3).

4.3.3 Hours of standing per working day

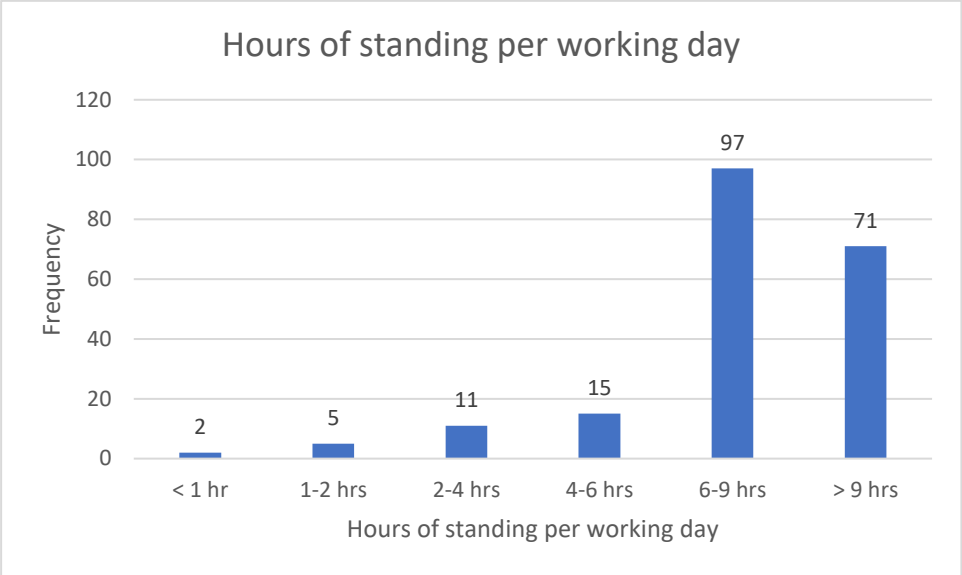


Figure 4.3.3: Bar chart distribution of hours of standing per working day of participants.

The vertical bar chart above showed the distribution of job position of participants in Figure 4.3.3. Based on the bar chart, it is evident that the majority of the participants are having 6 to 9 hours of standing per working day which makes up 48.3% of the sample with 97 fast food workers. Fast food workers with more than 9 hours of standing per working day is second in frequency with 71 participants or 35.3%. There are 15 participants representing 7.5% has 4 to 6 hours of standing per working day. Fast food workers who stand at work for 2 to 4 hours makes up 5.5% with 11 participants, followed by 1 to 2 hours of standing which makes up 2.5% with 5 participants. Lastly, fast food workers with less than 1 hour of standing makes up the final 1.0% with 2 participants (Table 4.3).

4.3.4 Hours of sitting per working day

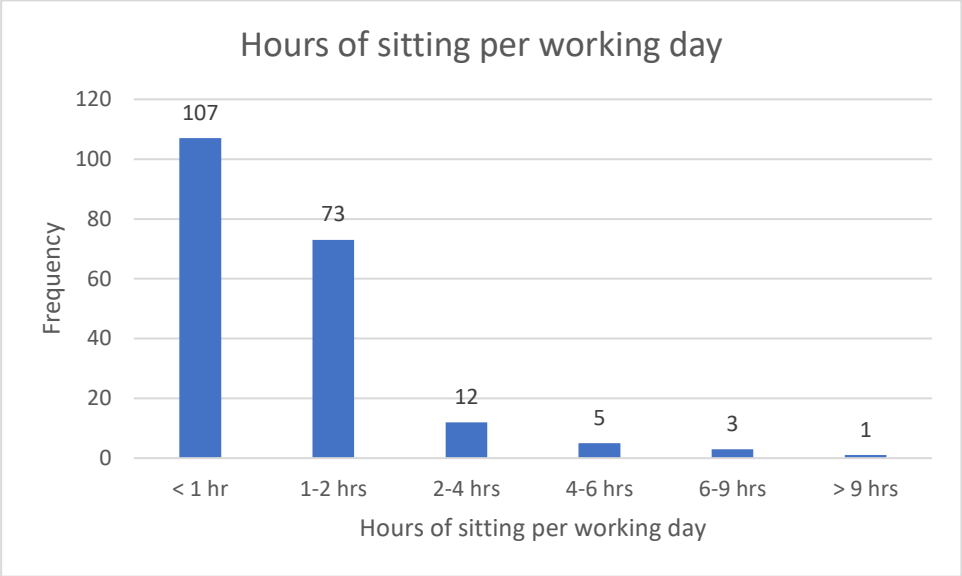


Figure 4.3.4: Bar chart distribution of hours of sitting per working day of participants.

Figure 4.3.4 above illustrates vertical bar chart distribution of hours of sitting per working day of fast food workers involved in this study. The majority of the fast food workers having less than 1 hour of sitting which makes up 53.2% with 107 of participants. Fast food workers with 1 to 2 hours of sitting per working day is second in frequency with 73 participants or 36.3%. There are 12 participants representing 6.0% has 2 to 4 hours of sitting per working day. There are 2.5% with 5 participants which have 4 to 6 hours of sitting per working day. Fast food workers who sit for 6 to 9 hours makes up 1.5% with 3 participants. Lastly, fast food workers with more than 9 hours of sitting makes up the final 0.5% with 1 participant (Table 4.3).

4.3.5 Weights lifted during work

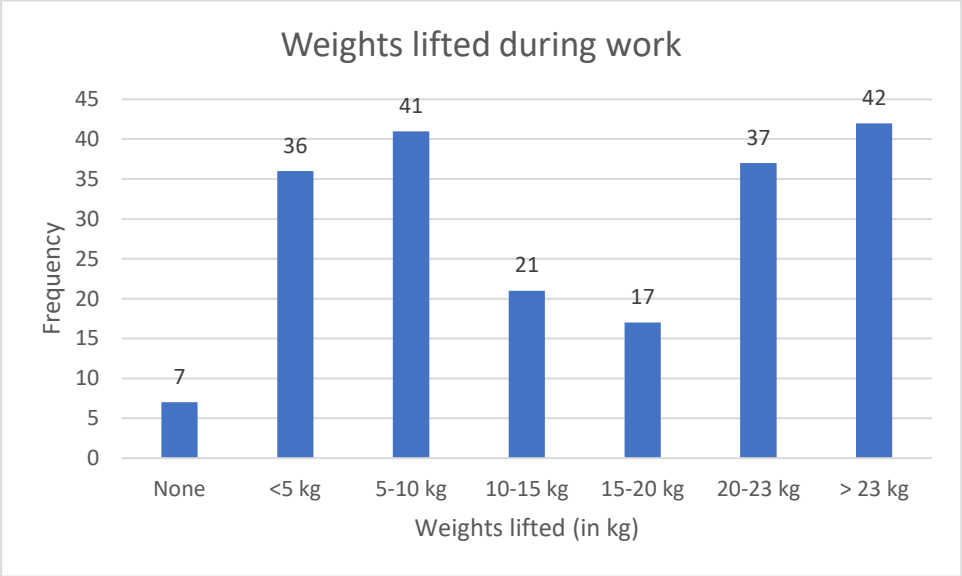


Figure 4.3.5: Bar chart distribution of weights lifted during work of participants.

The vertical bar chart above showing the distribution of weights lifted during work of participants in Figure 4.3.5. It is evident that the frequency of fast food workers lifts weights more than 23 kg, 5 to 10 kg, less than 5 kg and 20 to 23 kg are close, which are 42 (20.9%), 41 (20.4%), 36 (17.9%) and 37 (18.4%) respectively. 10 to 15 kg of weights lifted during work makes up 10.4% with 21 participants. 15 to 20 kg of weights lifted during work makes up 8.5% with 17 participants. The remaining 3.5% with 7 participants do not lift any weights (Table 4.3).

4.4 Lifestyle data of participants

This subsection highlights the lifestyle data of the participants in form of table summarizing the overall subsection, graphs and its descriptions.

Work related	**Frequency (%)**
N	201 (100)
Cigarettes or vape consumer	
Non-smoker or vaper	155 (77.1)
Current smoker or vaper	46 (22.9)
Physical exercise per week	
No	151 (75.1)
< 4 times	50 (24.9)
Use of tight stockings during activity	
No	163 (81.1)
Yes	38 (18.9)

Note: N = total number of participants
Table 4.4: Lifestyle data of participants

4.4.1 Cigarettes or vape consumer

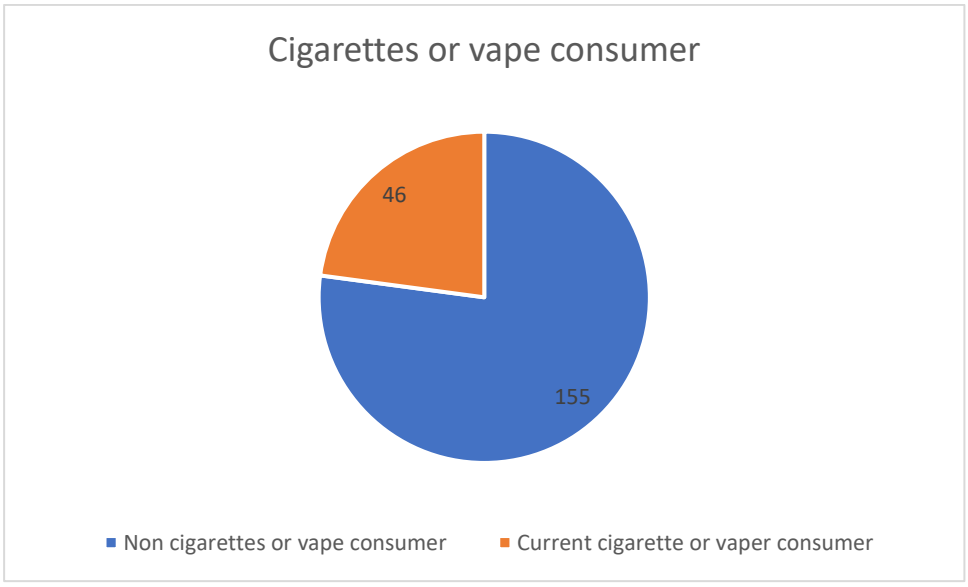


Figure 4.4.1: Pie chart distribution of cigarettes or vape consumer of participants.

The pie chart above showing the distribution of cigarettes or vape consumer of participants in Figure 4.4.1. It is evident that the majority of the fast food workers are non cigarettes or vape consumer which makes up 77.1% with 155 participants. Minority of the fast food workers are cigarettes or vape consumer which makes up 22.9% with 46 participants (Table 4.3).

4.4.2 Physical exercise per week

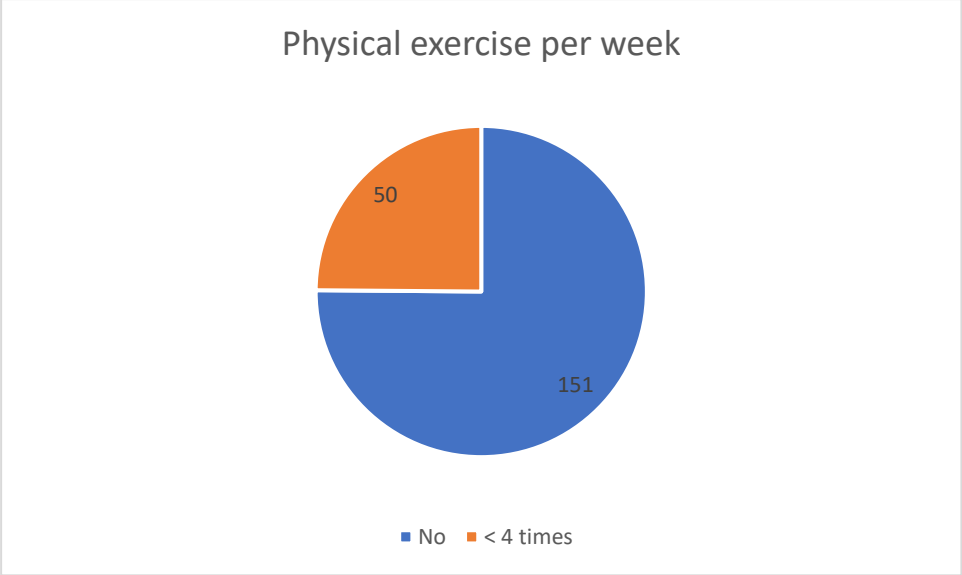


Figure 4.4.2: Pie chart distribution of physical exercise per week of participants.

The pie chart above showed the distribution of physical exercise per week of participants in Figure 4.4.2. It is evident that the majority of the fast food workers do not practice any physical exercises per week which makes up 75.1% with 151 participants. Only minority of the fast food workers do practice physical activity which makes up 24.9% with 50 participants (Table 4.3).

4.4.3 Use of tight stocking during activity

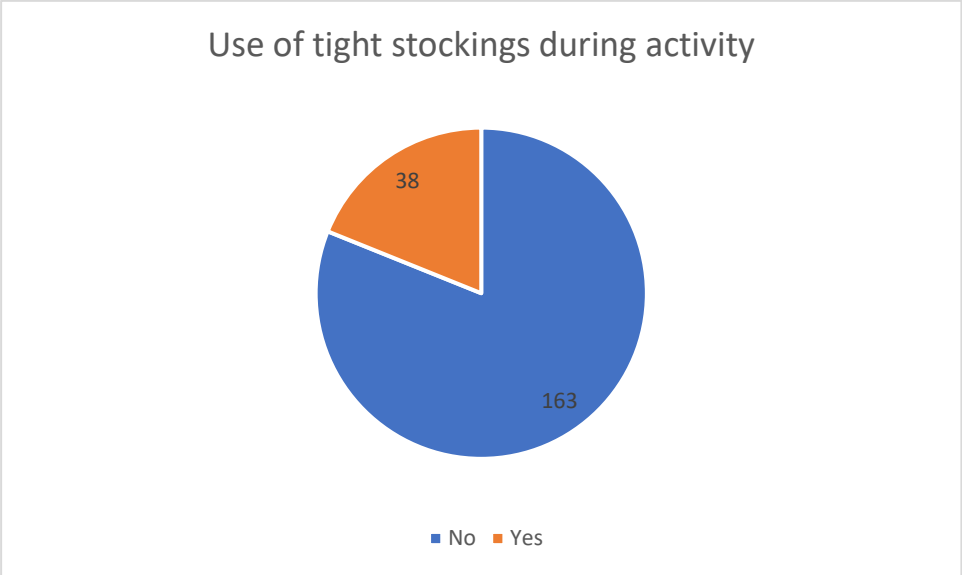


Figure 4.4.3: Pie chart distribution of the use of tight stockings during activity of participants.

The pie chart above showed the distribution of the use of tight stockings during activity of participants in Figure 4.4.3. Majority of the fast food workers do not wear tight stockings during activity which makes up 81.1% with 163 participants. Only 38 of the fast food workers do practice physical activity which makes up 18.9% (Table 4.3).

4.5 Diagnosis of Varicose veins among fast food workers

This subsection highlights diagnosis of varicose veins (independent variable) of the participants in form of table summarizing the overall subsection, graphs and its descriptions.

Variable	Frequency (%)
N	201 (100)
Dx with Varicose veins	
No	192 (95.5)
Yes	9 (4.5)

Note: N = total number of participants, Dx = Diagnose
Table 4.5: Diagnosis of varicose veins of participants

4.5.1 Diagnosis of Varicose Veins

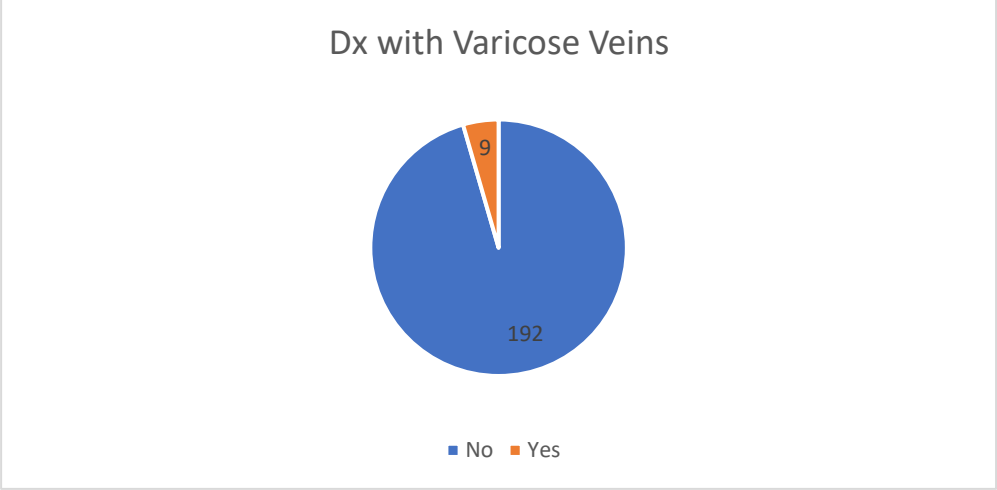


Figure 4.5.1: Pie chart distribution of the diagnosis of varicose veins of participants.

The pie chart above showing the distribution of the diagnosis of varicose veins of participants in Figure 4.5.1. Majority of the fast food workers had not been diagnosed with varicose veins which makes up 95.5% with 192

participants. Only 9 of the fast food workers had been diagnosed with varicose veins which made up 4.5% (Table 4.5).

4.6 Relational components of varicose veins

This subsection highlights the relational components of varicose veins of participants who are diagnosed with VVs (n = 9, 4.5%) in form of table summarizing the overall subsection, graphs and its descriptions.

Relational components	**Frequency (%)**	
	Participants Dx with varicose veins (n = 9)	**Total participants (n = 201)**
VVs in lower extremity		
One	1 (11.1)	1 (0.5)
Both	8 (88.9)	8 (4.0)
Received any medical treatment		
No	5 (55.6)	5 (2.5)
Yes	4 (44.4)	4 (2.0)
Types of medical treatment received		
Medications	3 (1.5)	3 (1.5)
Physiotherapy	1 (0.5)	1 (0.5)

Note: N = total number of participants, VVs = Varicose Veins, Dx = diagnose
Table 4.6: Relational components of varicose veins of participants

4.6.1 Presences of Varicose Veins in Lower Extremity

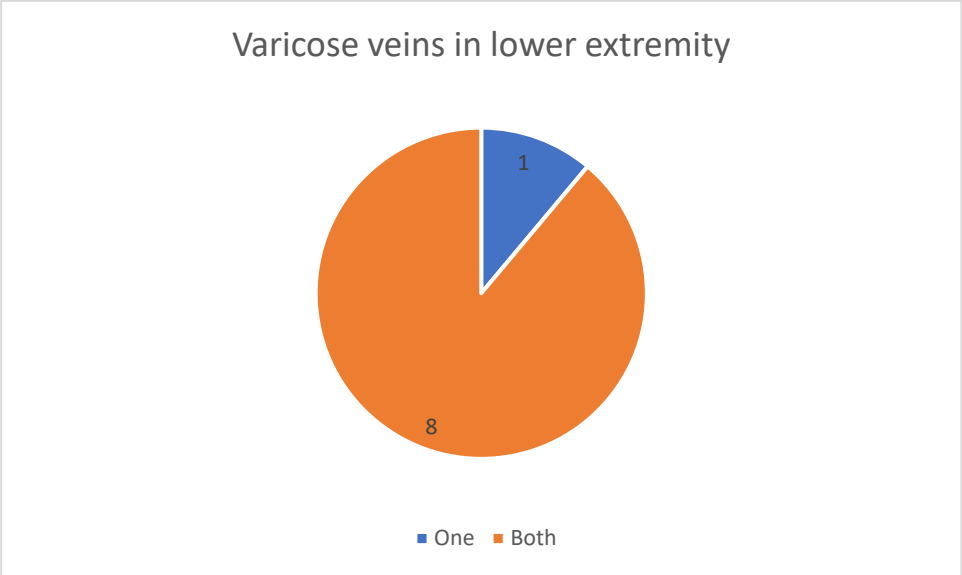


Figure 4.6.1: Pie chart distribution of presences of Varicose Veins in lower extremity of participants.

The pie chart above showed the distribution of the diagnosis of varicose veins of participants in Figure 4.6.1. Among the 9 out of 201 participants who had been diagnosed with varicose veins, there is only 1 (0.5%) participant had unilateral varicose veins. The remaining 8 (4.0%) who had been diagnosed with bilateral lower extremity varicose veins (Table 4.6).

4.6.2 Received any of medical treatment

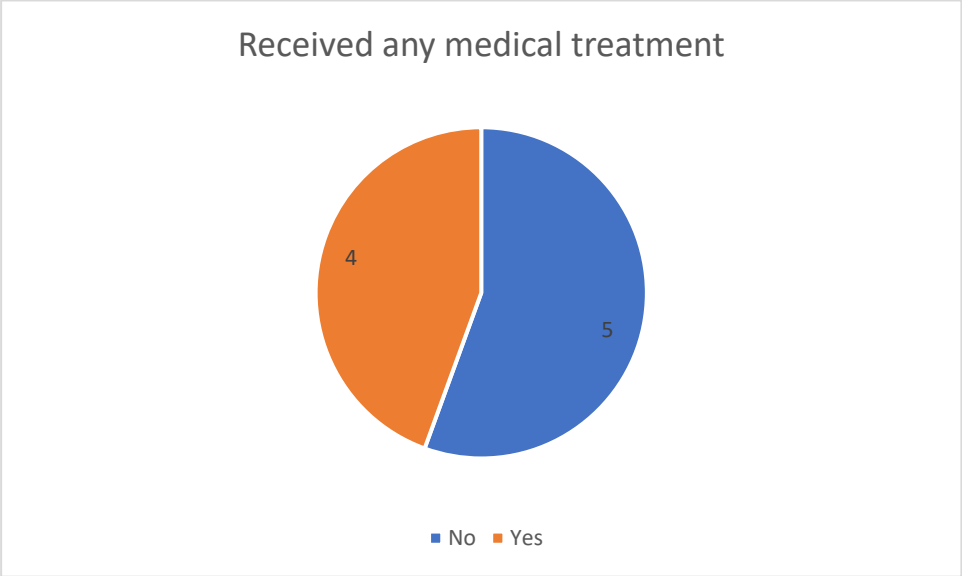


Figure 4.6.2: Pie chart distribution of receiving any medical treatment of participants with VVs.

Based on Figure 4.6.2, the pie chart above presents the distribution of receiving any of medical treatment of participants with varicose veins. Out of the 9 participants who had been diagnosed with varicose veins, the frequency and percentage of participants who received and not received to medical treatment are 5 (2.5%) and 4 (2.0%) respectively (Table 4.6).

4.6.3 Types of medical treatment received

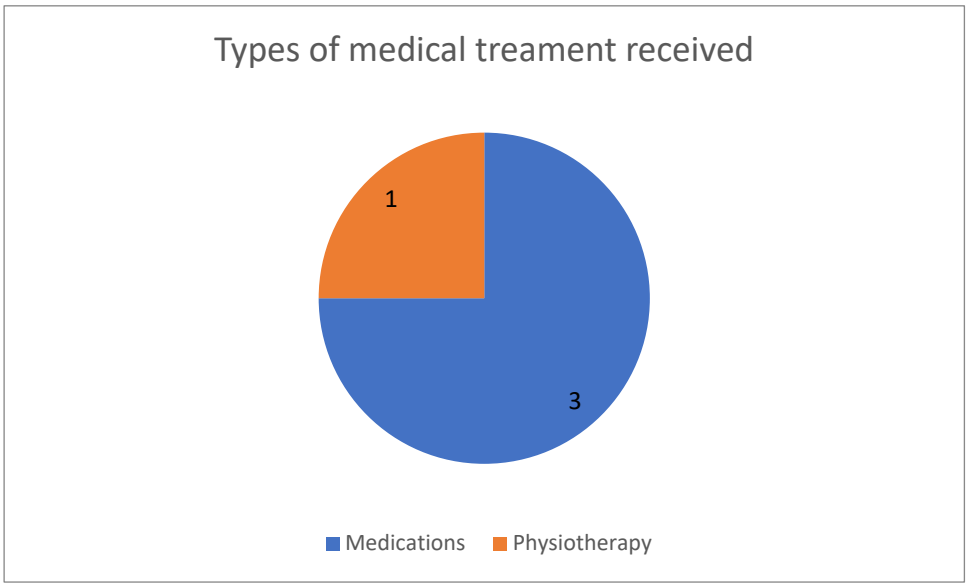


Figure 4.6.3: Pie chart distribution of types of medical treatment received by participants with VVs.

The above pie chart Figure 4.6.3 is presenting on the distribution of types of medical treatment received by participants with varicose veins. Out of the 9 participants who had been diagnosed with varicose veins, only total of 4 had received medical treatment. The medical treatment received are medications and physiotherapy which makes up 3 (1.5%) and 1 (0.5%) of the participants respectively (Table 4.6).

4.7 Signs and symptoms of lower extremity varicose veins

This subsection highlights the signs and symptoms of lower extremity varicose veins (foot, ankle or calf) among participants who are not diagnosed with VVs (n = 192, 95.5%) in form of table summarizing the overall subsection, graphs and its descriptions.

Signs and symptoms of LLVVs	**Frequency (%)**	
	Participants not Dx with varicose veins (n = 192)	**Total participants (n = 201)**
Worm- like appearance in dark blue purple colour		
No	141 (73.4)	141 (70.1)
Yes	51 (26.6)	51 (25.4)
Continuous pain and swelling		
No	131 (68.2)	131 (65.2)
Yes	61 (31.8)	61 (30.3)
Worsened pain after standing more than 4 hours		
No	83 (43.2)	83 (41.3)
Yes	109 (56.8)	109 (54.2)
Itching and burning sensation over the worm-like appearance area		
No	152 (79.2)	152 (75.6)
Yes	40 (20.8)	40 (19.9)

Note: N = total number of participants, LLVV = Lower Leg Varicose Veins, Dx = diagnose

Table 4.7: Signs and symptoms of varicose veins of undiagnosed participants

4.7.1 Worm- like appearance in dark blue purple colour

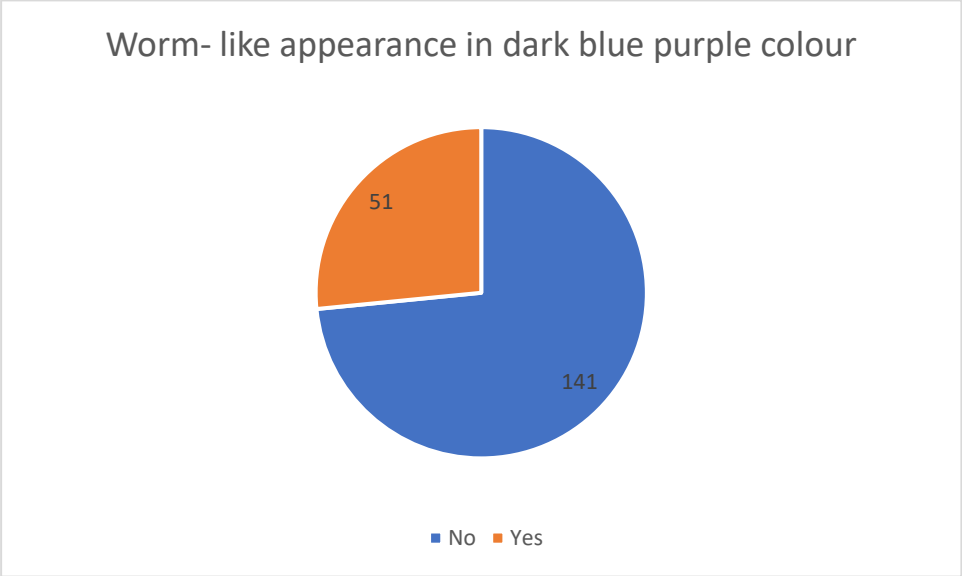


Figure 4.7.1: Pie chart distribution of worm- like appearance in dark blue purple colour in lower extremity among participants have not diagnosed with VVs.

The above pie chart Figure 4.7.1 is presenting on the distribution of worm- like appearance in dark blue purple colour in lower extremity among participants who are not diagnosed with varicose veins. Out of the 192 participants who had not been diagnosed with varicose veins, a frequency of the fast food workers had worm- like appearance in dark blue purple colour in lower extremity which is 51 (25.4%). There is 141 (70.1%) participants does not have this sign of varicose veins (Table 4.7).

4.7.2 Pain and swelling

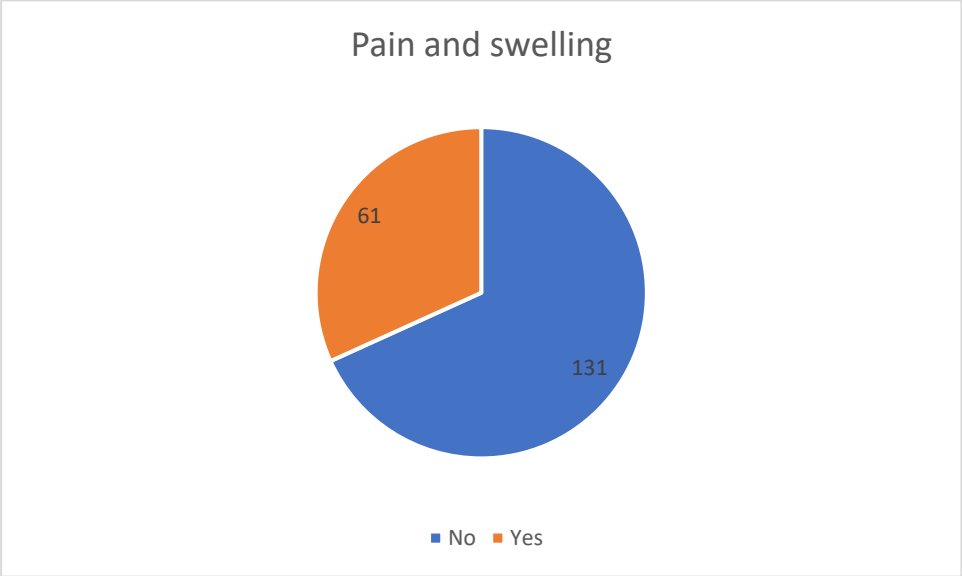


Figure 4.7.2: Pie chart distribution of pain and swelling symptoms in lower extremity among participants have not diagnosed with VVs.

Based on Figure 4.7.2, the pie chart above presents the distribution of pain and swelling symptoms among participants who are not diagnosed with varicose veins. Among the 192 participants who had not been diagnosed with varicose veins, the frequency and percentage of participants who had experience continuous pain and swelling is 131 (65.2%). Those who do not experience this symptom makes up 30.3% with 61 participants (Table 4.6).

4.7.3 Worsened pain after standing more than 4 hours

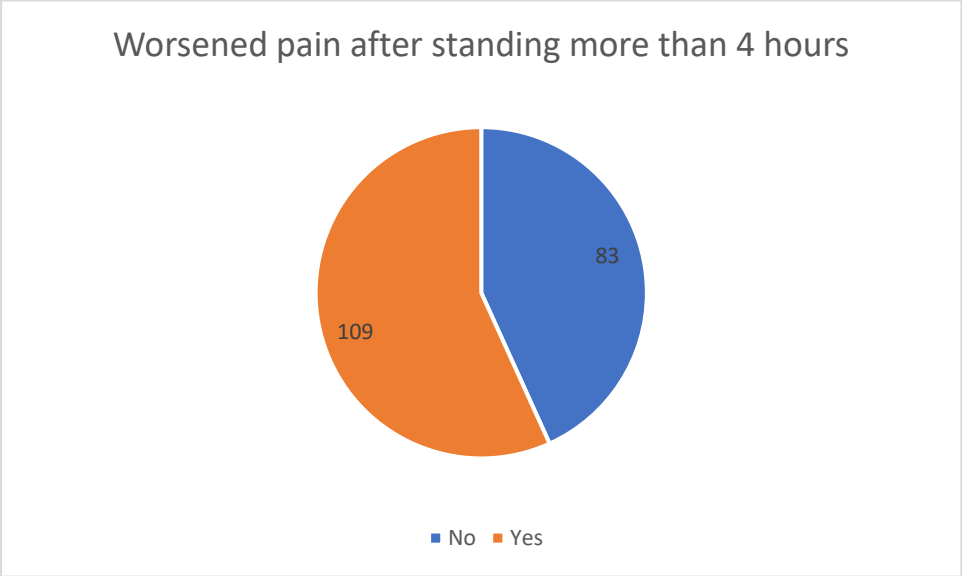


Figure 4.7.3: Pie chart distribution of experienced worsened pain after standing more than 4 hours in lower extremity among participants have not diagnosed with VVs.

The pie chart above showing the distribution of experienced worsened pain after standing more than 4 hours in lower extremity among participants not diagnosed with VVs in Figure 4.7.3. It is evident that the majority of the fast food workers who are not diagnosed with varicose veins experienced worsened pain after standing more than 4 hours in lower extremity which representing 54.2% with 109 participants. On the other hand, there is 41.3% with 83 participants did not experience worsened pain after standing more than 4 hours (Table 4.7).

4.7.4 Itching and burning sensation over the worm-like appearance area

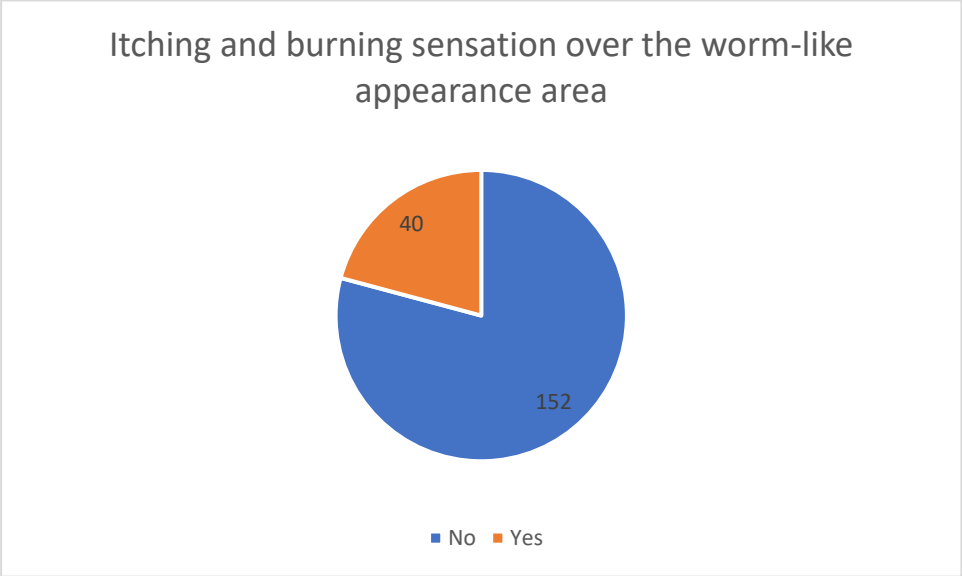


Figure 4.7.3: Pie chart distribution of itching and burning sensation over the worm-like appearance area among participants have not diagnosed with VVs.

According to the pie chart above in Figure 4.7.3, it had shown the distribution of itching and burning sensation over the worm-like appearance area among participants have not diagnosed with VVs. It is evident that the majority of the fast food workers who are not diagnosed with varicose veins did not experience any itching and burning sensation in lower extremity which representing 75.6% with 152 participants. However, there is 19.9% with 40 participants had itching and burning sensation over the worm-like appearance area (Table 4.6).

4.8 Comorbidities of varicose veins

This subsection highlights the comorbidities of varicose veins among all participants in form of table summarizing the overall subsection, graphs and its descriptions.

Comorbidities	**Frequency (%)**
N	201 (100)
Family Hx	
No	185 (92.0)
Yes	16 (8.0)
DVT	
No	201 (100.0)
Yes	0 (0.00)
CAD	
No	198 (98.5)
Yes	3 (1.5)
HTN	
No	171 (85.1)
Yes	30 (14.9)
Constipation	
No	164 (81.6)
Yes	37 (18.4)
DM	
No	174 (86.6)
Yes	27 (13.4)
KD	
No	200 (99.5)
Yes	1 (0.5)
RA	
No	192 (95.5)
Yes	9 (4.5)

Hx of leg trauma	
No	123 (61.2)
Yes	78 (38.8)

Note: N = total number of participants, Dx = Diagnose
Table 4.8: Comorbidities of varicose veins among the participants

4.8.1 Family History of VVs

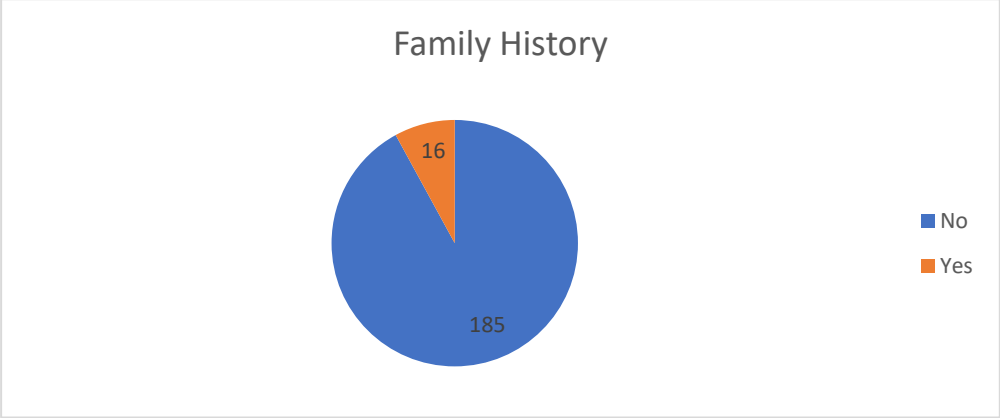


Figure 4.8.1: Pie chart distribution of family history of VVs of participants.

According to the pie chart above in Figure 4.8.1, it had shown the distribution of family history of participants. It is evident that the majority of the fast food workers who do not has family history of VVs which representing 92.0% with 185 participants. However, there is 8.0% with 16 participants had family history of VVs (Table 4.8).

4.8.2 Deep vein thrombosis

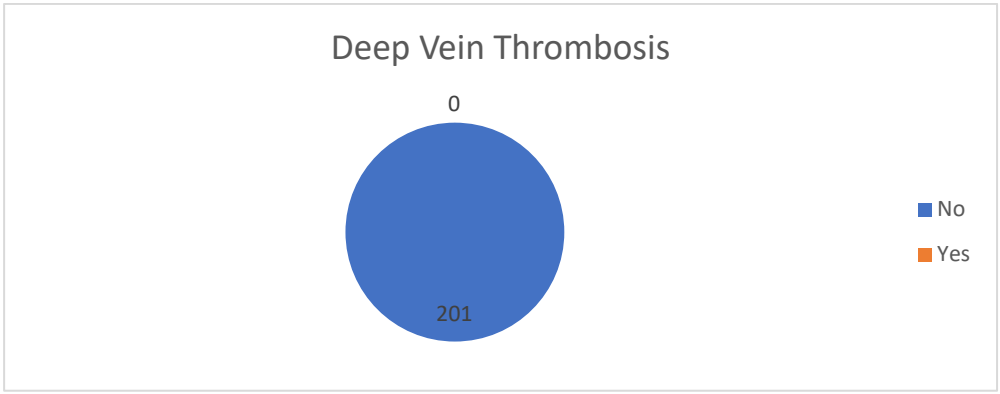


Figure 4.8.2: Pie chart distribution of deep vein thrombosis of VVs of participants.

According to the pie chart above in Figure 4.8.2, it had shown the distribution of family history of participants. It is evident that all of the fast food workers do not DVT which representing 100.0% with 201 participants (Table 4.8).

4.8.3 Coronary artery disease

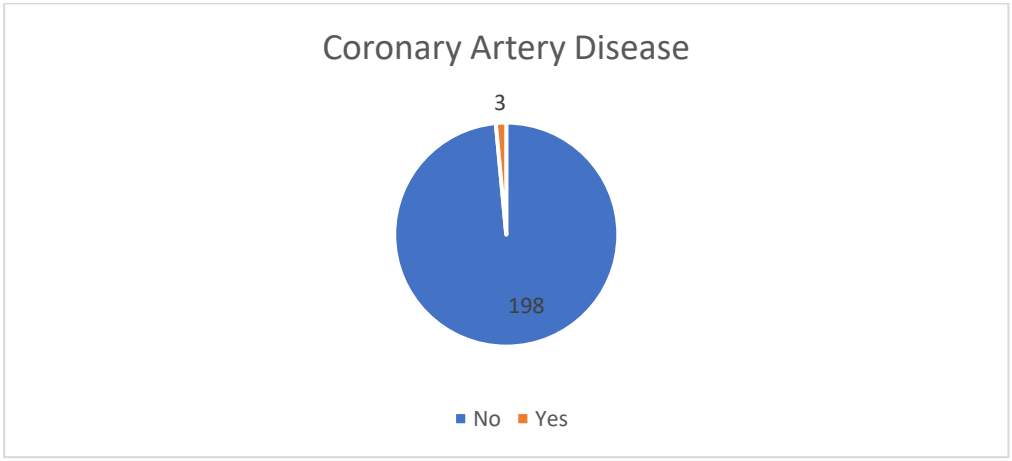


Figure 4.8.3: Pie chart distribution of coronary artery disease of participants.

According to the pie chart above in Figure 4.8.3, it had shown the distribution of CAD of participants. Majority of the fast food workers do not CAD which representing 98.5% with 198 participants, while a minority of fast food workers with CAD representing 1.5% with 3 participants (Table 4.8).

4.8.4 Hypertension

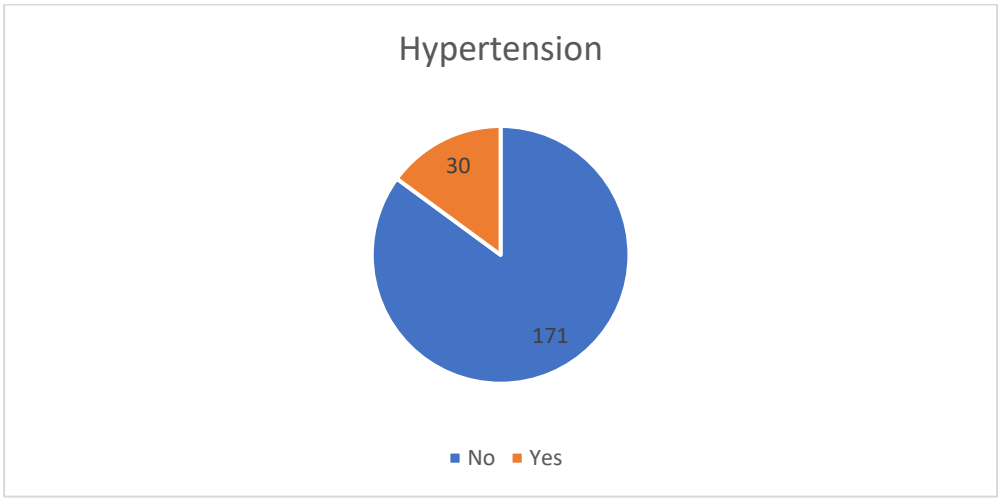


Figure 4.8.4: Pie chart distribution of hypertension of participants.

The pie chart above in Figure 4.8.4, it had shown the distribution of HTN of participants. Majority of the fast food workers do not HTN which representing 85.1% with 171 participants, while a minority of fast food workers with HTN representing 14.9% with 30 participants (Table 4.8).

4.8.5 Constipation

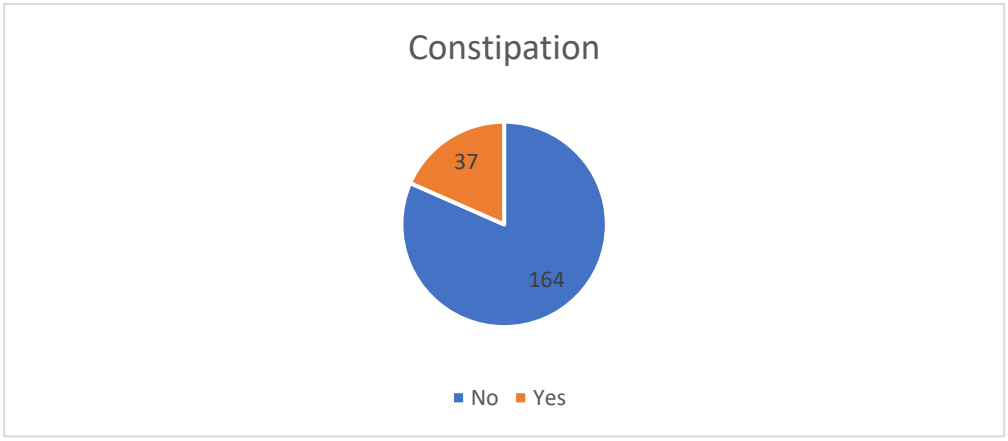


Figure 4.8.5: Pie chart distribution of constipation of participants.

The pie chart above in Figure 4.8.5, it had shown the distribution of constipation of participants. There is 85.1% with 171 participants in frequent who do not have constipation, while remaining 18.4% with 37 participants has constipation (Table 4.8).

4.8.6 Diabetes mellitus

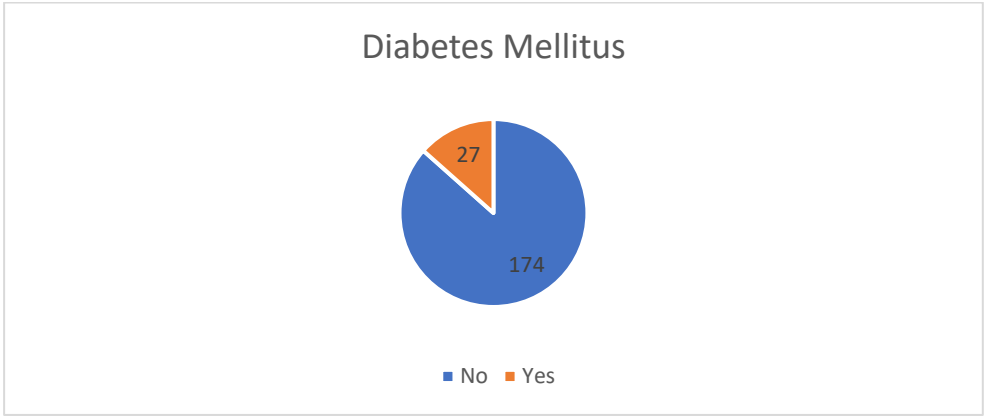


Figure 4.8.6: Pie chart distribution of diabetes mellitus of participants.

The pie chart above in Figure 4.8.6, it had shown the distribution of DM of participants. There is 86.6% with 174 participants in frequent who do not have DM, while remaining 13.4% with 27 participants has DM (Table 4.8).

4.8.7 Kidney disease

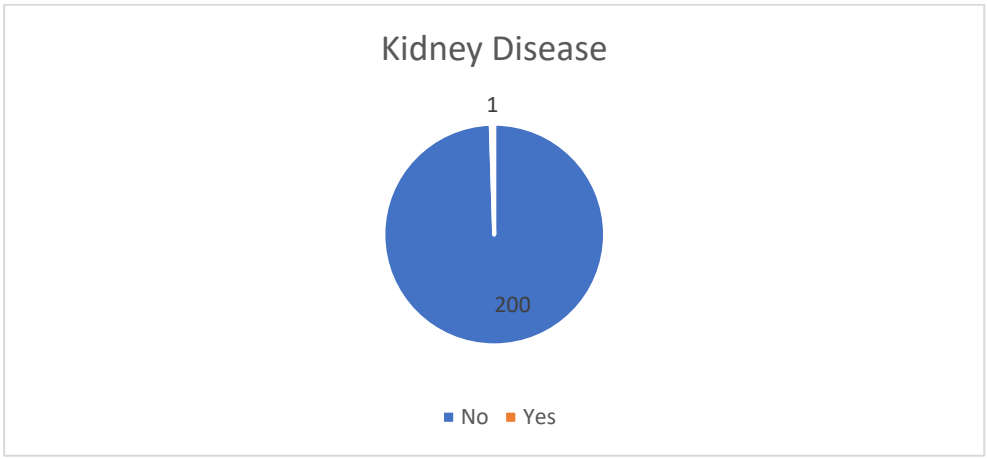


Figure 4.8.7: Pie chart distribution of kidney disease of participants.

The pie chart above in Figure 4.8.7, it had shown the distribution of DM of participants. There is only 0.5% with 1 participants in frequent to have KD, while the rest occupying 99.5% with 200 participants who do not have KD (Table 4.8).

4.8.8 Rheumatoid arthritis

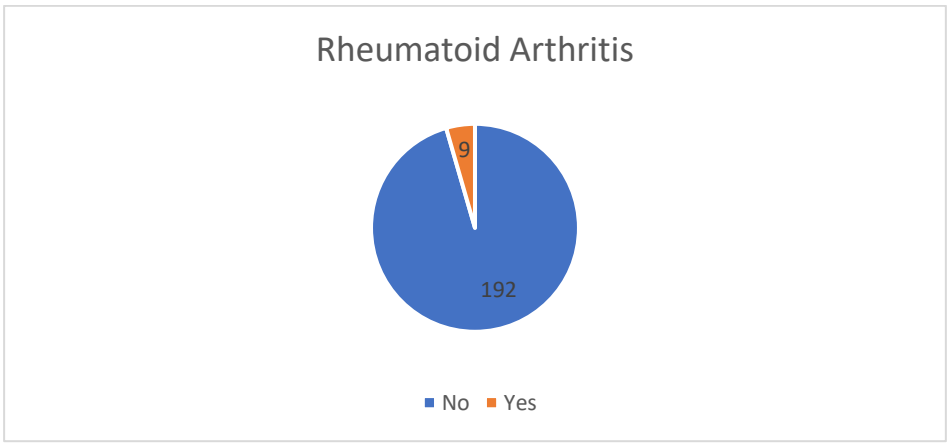


Figure 4.8.8: Pie chart distribution of rheumatoid arthritis of participants.

According to the pie chart above in Figure 4.8.8, it had shown the distribution of RA of participants. There is only 4.5% with 9 participants in frequent to have RA, while the rest occupying 95.5% with 192 participants who do not have RA (Table 4.8).

4.8.9 History of leg trauma

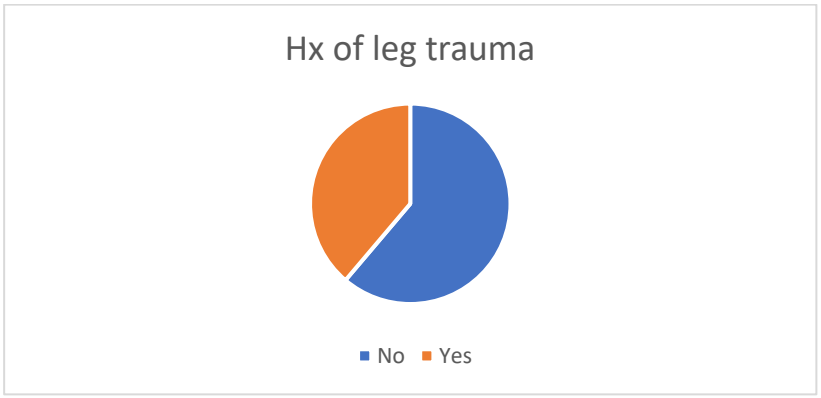


Figure 4.8.9: Pie chart distribution of history of leg trauma of participants.

According to the pie chart above in Figure 4.8.9, it had shown the distribution of RA of participants. There is 38.8% with 78 participants in frequent to have Hx of leg trauma, while the rest occupying 61.2% with 123 participants who do not have Hx of leg trauma (Table 4.8).

4.9 Prevalence of varicose veins among fast food workers

Characteristics	Frequency (%)		
	Participants Dx with VVs (n = 9, 4.5%)	Participants not Dx with VVs (n = 192, 95.5%)	Total participants (n = 201)
Age (years)			
16-20	1 (11.1)	38 (19.8)	39 (19.4)
21-30	3 (33.3)	71 (37.0)	74 (36.8)
31-40	2 (22.2)	43 (22.4)	45 (22.4)
41-50	2 (22.2)	15 (7.5)	17 (8.5)
51-60	1 (11.1)	14 (7.3)	15 (7.5)
>60	0 (0.0)	11 (5.7)	11 (5.5)
Gender			
Male	3 (33.3)	114 (59.4)	117 (58.2)
Female	6 (66.7)	78 (40.6)	84 (41.8)
Ethnicity			
Malay	2 (22.2)	52 (27.1)	54 (26.9)
Chinese	5 (55.6)	109 (56.8)	114 (56.7)
Indian	1 (11.1)	24 (12.5)	25 (12.4)
Kadazan Dusun	1 (11.1)	4 (2.1)	5 (2.5)
Myanmar	0 (0.0)	3 (1.6)	3 (1.5)
Social status			
Single	3 (33.3)	135 (70.3)	138 (68.7)
Married	6 (66.7)	57 (29.7)	63 (31.3)
Level of body weight (classified according to BMI)			
Underweight (<=18.5)	0 (0.0)	19 (9.9)	19 (9.5)
Normal (<=24.9)	6 (66.7)	122 (63.5)	128 (63.7)
Overweight (<=29.9)	2 (22.2)	34 (17.7)	36 (17.9)
Obesity (>30)	1 (11.1)	17 (8.9)	18 (9.0)
Job position			
Barista	0 (0.0)	29 (15.1)	29 (14.4)
Store Manager	2 (22.2)	12 (6.2)	14 (7.0)
Food Vendors	2 (22.2)	19 (9.9)	21 (10.4)
Service Crew	1 (11.1)	47 (24.5)	48 (23.9)
Kitchen Crew	4 (44.4)	85 (44.3)	89 (44.3)

Years of working experience, mean (SD), [range]	4.33 (2.29), [2.0 - 10.0]	4.89 (6.56), [0.1 - 40.0]	4.86 (6.43), [0.1 - 40.0]
Shifts per day (1 shift = 8 hours)			
1 shift	6 (66.7)	104 (54.2)	110 (54.7)
2 shifts	3 (33.3)	87 (45.3)	90 (44.8)
3 shifts	0 (0.0)	1 (0.5)	1 (0.5)
Working days per week			
1-2 days	0 (0.0)	24 (12.5)	24 (11.9)
3-4 days	2 (22.2)	24 (12.5)	26 (12.9)
5-6 days	5 (55.6)	124 (64.6)	129 (64.2)
7 days	2 (22.2)	20 (10.4)	22 (10.9)
Hours of standing per working day			
< 1 hr	0 (0.0)	2 (1.0)	2 (1.0)
1-2 hrs	0 (0.0)	5 (2.6)	5 (2.5)
2-4 hrs	0 (0.0)	11 (5.7)	11 (5.5)
4-6 hrs	1 (11.1)	14 (7.3)	15 (7.5)
6-9 hrs	6 (66.7)	91 (47.4)	97 (48.3)
> 9 hrs	2 (22.2)	69 (35.9)	71 (35.3)
Hours of sitting per working day			
< 1 hr	6 (66.7)	101 (52.6)	107 (53.2)
1-2 hrs	3 (33.3)	70 (36.5)	73 (36.3)
2-4 hrs	0 (0.0)	12 (6.2)	12 (6.0)
4-6 hrs	0 (0.0)	5 (2.6)	5 (2.5)
6-9 hrs	0 (0.0)	3 (1.6)	3 (1.5)
> 9 hrs	0 (0.0)	1 (0.5)	1 (0.5)
Weights lifted (kg)			
None	1 (11.1)	6 (3.1)	7 (3.5)
<5 kg	1 (11.1)	35 (18.2)	36 (17.9)
5-10 kg	1 (11.1)	40 (20.8)	41 (20.4)
10-15 kg	0 (0.0)	21 (10.9)	21 (10.4)
15-20 kg	0 (0.0)	17 (8.9)	17 (8.5)
20-23 kg	4 (44.4)	33 (17.2)	37 (18.4)
> 23 kg	2 (22.2)	40 (20.8)	42 (20.9)
Cigarettes or vape consumer			
Non cigarettes or vape consumer	7 (77.8)	148 (77.1)	155 (77.1)
Current cigarette or vaper consumer	2 (22.2)	44 (22.9)	46 (22.9)
Physical exercise per week			

No	8 (88.9)	143 (74.5)	151 (75.1)
< 4 times	1 (11.1)	49 (25.5)	50 (24.9)
Use of tight stockings during activity			
No	4 (44.4)	159 (82.8)	163 (81.1)
Yes	5 (55.6)	33 (17.2)	38 (18.9)

Note: n = number of participants, VVs = Varicose Veins, Dx = Diagnose, BMI = Body Mass Index, SD = Standard Deviation.

Table 4.9: Characteristics of the study participants

Table 4.9 shows the characteristics of the study participants which is fast food workers. The demographic data of fast food workers has been analysed to identify the prevalence of VVs. The prevalence of VVs among fast food workers of this study is 4.5%, in males is 33.3%, in females is 66.7%. In this study, age group from 21 to 30 years old is the most common age group to develop VVs with a prevalence of 33.3%. Followed by age group from 31 to 40 years old, 41 to 50 years old and 50 to 60 years old, with 22.2%, 22.2% and 11.1% respectively. The highest prevalence of VVs among different ethnicities is Chinese, which is 55.6%, followed by Malay with 22.2%, both Indian and Kadazan Dusun are 11.1%. There is no VVs in Myanmar. The prevalence of VVs among fast food workers who are married is 66.7%, which is twice higher than the singles, with 33.3%. According to level of body weight (classified according to BMI) in this study, the highest prevalence is among fast food workers with normal (<= 24.9) body weight. The other levels of body weights are overweight (<=29.9) and obesity (>30) with 22.2% and 11.1% of prevalence respectively. There is no VVs in underweight (<= 18.5). According to the job positions, kitchen crew has the highest prevalence of VVs with 44.4% and the lowest is service crew, with 11.1%. Both store manager and food vendors has prevalence of VVs with 22.2%, Barista shows no VVs. Years of

working experiences as fast food workers with VVs has mean years of 4.3 and standard deviation of 2.3 years.

Prevalence of VVs is identified in relation to work related variables. Fast food workers who work for 2 shifts has 33.3% of prevalence while work for 1 shift has 66.7% of prevalence. Prevalence of VVs among fast food workers who work for 5 to 6 days is 55.6%, which is the highest, followed by both 3 to 4 days and 7 days of work, with similar prevalence, which is 22.2%. Fast food workers who stand for 6 to 9 hours has highest prevalence of VVs with 66.7%, followed by standing for more than 9 hours with 22.2% and least is 4 to 6 hours with 11.1%. There is no VVs among fast food workers who stands for less than 4 hours. Fast food workers who only sit for less than 1 hour and 1 and 2 hours has 66.6% and 33.3% of prevalence of VVs respectively. The highest prevalence of VVs is among fast food workers who carries weights of 20 to 23 kg with 44.4%, while carry weights more than 23 kg has 22.2% of prevalence, followed by 5 to 10 kg, less than 5 kg and not carrying any weights has similar prevalence, which is 11.1%.

Prevalence of VVs is identified in relation to lifestyle variables. Non cigarettes or vape consumer has 77.8% of prevalence of VVs while current cigarettes or vape consumer has 22.2%. Fast food workers who have not practicing physical exercise per week has higher prevalence of VVs compare those who exercise less than 4 times pre week, which is 88.9% and 11.1% respectively. Fast food workers who had diagnosed with VVs use tight stockings during activity has 44.4% of prevalence of VVs compared to those

who did not, which is 55.6%. This has shown that there is low awareness on conservative management by using tight stocking to prevent and worsening of VVs.

4.10 Risk factors associated with varicose veins among the participants

Risk factors	**Frequency (%)**		
	Participants Dx with VVs (n = 9)	**Participants not Dx with VVs (n = 192)**	**p-value**
Age (years)			0.60
16-20	1 (11.1)	38 (19.8)	
21-30	3 (33.3)	71 (37.0)	
31-40	2 (22.2)	43 (22.4)	
41-50	2 (22.2)	15 (7.5)	
51-60	1 (11.1)	14 (7.3)	
>60	0 (0.0)	11 (5.7)	
Gender			0.17
Male	3 (33.3)	114 (59.4)	
Female	6 (66.7)	78 (40.6)	
Ethnicity			0.47
Malay	2 (22.2)	52 (27.1)	
Chinese	5 (55.6)	109 (56.8)	
Indian	1 (11.1)	24 (12.5)	
Kadazan Dusun	1 (11.1)	4 (2.1)	
Myanmar	0 (0.0)	3 (1.6)	
Social status			0.03
Single	3 (33.3)	135 (70.3)	
Married	6 (66.7)	57 (29.7)	
Level of body weight (classified according to BMI)			0.84
Underweight (<=18.5)	0 (0.0)	19 (9.9)	
Normal (<=24.9)	6 (66.7)	122 (63.5)	
Overweight	2 (22.2)	34 (17.7)	

(<=29.9)			
Obesity (>30)	1 (11.1)	17 (8.9)	
Years of working experience, mean (SD), [range]	4.3 (2.29), [2.0 - 10.0]	4.9 (6.56), [0.1 - 40.0]	0.99
Shifts per day (1 shift = 8 hours)			0.54
1 shift	6 (66.7)	104 (54.2)	
2 shifts	3 (33.3)	87 (45.3)	
3 shifts	0 (0.0)	1 (0.5)	
Working days per week			0.31
1-2 days	0 (0.0)	24 (12.5)	
3-4 days	2 (22.2)	24 (12.5)	
5-6 days	5 (55.6)	124 (64.6)	
7 days	2 (22.2)	20 (10.4)	
Hours of standing per working day			0.72
< 1 hr	0 (0.0)	2 (1.0)	
1-2 hrs	0 (0.0)	5 (2.6)	
2-4 hrs	0 (0.0)	11 (5.7)	
4-6 hrs	1 (11.1)	14 (7.3)	
6-9 hrs	6 (66.7)	91 (47.4)	
> 9 hrs	2 (22.2)	69 (35.9)	
Weights lifted (kg)			0.32
None	1 (11.1)	6 (3.1)	
<5 kg	1 (11.1)	35 (18.2)	
5-10 kg	1 (11.1)	40 (20.8)	
10-15 kg	0 (0.0)	21 (10.9)	
15-20 kg	0 (0.0)	17 (8.9)	
20-23 kg	4 (44.4)	33 (17.2)	
> 23 kg	2 (22.2)	40 (20.8)	
Cigarettes or vape consumer			1.00
Non cigarettes or vape consumer	7 (77.8)	148 (77.1)	
Current cigarette or vaper consumer	2 (22.2)	44 (22.9)	
Physical exercise per week			0.46
No	8 (88.9)	143 (74.5)	
< 4 times	1 (11.1)	49 (25.5)	
Family Hx			0.15

No	7 (77.8)	178 (92.7)	
Yes	2 (22.2)	14 (7.3)	
DVT			
No	9 (100.0)	192 (100.0)	
Yes			
CAD			1.00
No	9 (100.0)	189 (98.4)	
Yes	0 (0.0)	3 (1.6)	
HTN			0.03
No	5 (55.6)	166 (86.5)	
Yes	4 (44.4)	26 (13.5)	
Constipation			0.01
No	4 (44.4)	160 (83.3)	
Yes	5 (55.6)	32 (16.7)	
DM			0.00
No	2 (22.2)	172 (89.6)	
Yes	7 (77.8)	20 (10.4)	
KD			1.00
No	9 (100.0)	191 (99.5)	
Yes	0 (0.0)	1 (0.5)	
RA			0.06
No	7 (77.8)	185 (96.4)	
Yes	2 (22.2)	7 (3.6)	
Hx of leg trauma			0.31
No	4 (44.4)	119 (62.0)	
Yes	5 (55.6)	73 (38.0)	

Note: n = number of participants, VVs = Varicose Veins, Dx = Diagnose, BMI = Body Mass Index, SD = Standard Deviation. Hx = History, DVT = Deep Vein Thrombosis, CAD = Coronary Artery Disease, HTN = Hypertension, DM = Diabetes Mellitus, KD = Kidney Disease, RA = Rheumatoid Arthritis

Table 4.10: Risk factors associated with varicose veins among participants

Table 4.10 shows the risk factors associated with varicose veins among the participants. Concerning risk factors of VVs, chi square (χ^2) or Fisher's exact test revealed a statistically significant association between VVs and social status ($p = 0.03$), hypertension ($p = 0.03$), constipation ($p = 0.01$), diabetes mellitus ($p = 0.00$) and rheumatoid arthritis ($p = 0.06$). Age, gender, ethnicity, level of body weight, shifts per day, working days per week, hours of

standing per working day, weights lifted, cigarettes or vape consumer, physical exercise per week, family history, coronary artery disease, kidney disease and history of leg trauma are not significant predictors of VVs ($p > 0.05$) in Table 4.10. Univariate analysis test revealed that the years of working experience has no significant association with VVs ($p = 0.99$).

Comorbidities of VVs is being analysed among fast food workers with VVs. Fast food workers who have family history of VVs has 22.2% of prevalence of VVs. The prevalence of VVs among fast food workers had been diagnosed with HTN is 44.4%. The prevalence of VVs among fast food workers had constipation is 55.6%. The prevalence of VVs among fast food workers had been diagnosed with DM is 77.8%. All fast food workers who are diagnosed with VVs does not has any prevalence with DVT, CAD and KD. Prevalence of VVs among fast food workers diagnosed with RA is 22.2%. The prevalence of VVs among fast food workers who has history of leg trauma is 55.6%. Any association of these comorbidities with VVs will be discussed in Discussion.

CHAPTER 5

DISCUSSION

5.1 Chapter overview

This chapter will outline the discussion on significant findings from the results sections in accordance with the research objectives, which will follow with the limitation of study, recommendations for future research as well as the funding of the research project.

5.2 Prevalence of Varicose Veins among fast food workers in Cheras, Selangor

One of the most widespread signs of vascular problems is regarded as varicose veins. Age, sex, and prolonged standing are among the many factors contributing to the disease's rising incidence (Busbaih et al., 2022). One of the main contributing factors to the high incidence rate of VVs has been identified as the occupations that involve prolonged standing, including those of teachers, clerks, dealers, labourers, road cleaners, receptionists, security guards, and nursing personnel (Aslam et al., 2022). Despite many research study regarding VVs, there is a lack of study among occupation population with VVs, especially on fast food workers in Malaysia as well as internationally. Therefore, in this research study, the study determined and investigated the prevalence of VVs among fast food workers in Cheras, Selangor by using self-modified questionnaire. According to the findings, the prevalence of this

research study among fast food workers is 4.5%, with a total of 9 fast food workers among 201 fast food workers who has reported on being diagnosed with VVs. However, the remaining 95.5% who are not diagnosed with VVs may have develop signs and symptoms of VVs.

Our study shows that 58.2% of the participants are male and 41.8% are female in total. However, the prevalence of VVs is determined to be 33.3% of male fast food workers, and 66.7% of females fast food workers. A study in Saudi Arabia has reported on the prevalence of VVs according to gender among the nurses, female was 88.2%, compared with 11.8% (Ali et al., 2022). A research study mentioned that male's rates range from 10 to 30 percent, while female's rates range from 25 to 55 percent (Mahmood et al., 2021), thus it has been proven in this study result. In a cross-sectional study, Bahk et al. found that female had a greater prevalence rate of VVs than males did, reporting 21.8% and 9.5%, respectively, for both genders (Aslam et al., 2020). There are numerous studies had used to claim that the increased prevalence of VVs in female may be caused by a number of physiological disorders unique to female, although it may also be for different causes in male (Mahmood et al., 2021).

In this study, age group from 21 to 30 years old is the most common age group to develop VVs with a prevalence of 33.3%. A study has shown similar findings on the majority of the patients, or more than 45%, fell between the age range of 21 to 30 years, according to the age distribution (Sharma et al., 2013). This study also proven that as age increases, there is higher prevalence

of VVs. However, there is no prevalence of VVs shown among age above 60 years old in this study, which is due to low frequency of participants. The most prevalent age range in the study where VVs developed was between the ages of 36 and 45 years old, with a prevalence of 65% among the individuals (Dalboh et al., 2020). Other research produced conclusions that were comparable (Dalboh et al., 2020). According to Dalboh et al. (2020), 62.5% of varicose vein patients were between the ages of 21 and 40 years old, and in another study, this age range represented 65% of the study population.

The result of this study shows highest prevalence of VVs among different ethnicities is Chinese, which is 55.6%, followed by Malay with 22.2%, both Indian and Kadazan Dusun are 11.1%; Myanmar do not have any prevalence of VVs. According to Aslam et al. (2022), western countries and developed nations have a higher prevalence of this illness. A study found that 88.2% of nurses with varicose veins were Arabian, compared to 10.5% Asian and just 1.3% African, indicating that ethnicity was a risk factor for varicose veins (Ali et al., 2022). As a result, it is comparable to our current study in that Malaysia is one of the world's more developed nations, whereas Myanmar is not. All Malaysian ethnic groups, who are a part of Asia, have a high prevalence of VVs. The prevalence of VVs among fast food workers who are married is 66.7%, which is twice higher than the singles, with 33.3%. According to Albader et al. (2020), the study found that there was a correlation between VVs and socioeconomic status, which might be explained by the idea that marriage may unintentionally increase the incidence of VVs in women because of multiparity. A study has shown that of the nurses who had varicose

veins diagnosed, 51 (67.1%) were married, compared to 24 (31.6%) who were single and 1 (1.3%) who had been divorced (Ali et al., 2022). As a result, the results are consistent with the current study.

According to level of body weight (classified according to BMI) in this study, the highest prevalence is among fast food workers with normal (<= 24.9) body weight. The other body weight categories are overweight (<=29.9) and obesity (>30), with respective prevalence rates of 22.2% and 11.1%. Fast food workers who falls under the category of underweight (<= 18.5), there are no VVs. These results are in line with a study by Dimakakos et al. (2013) on the prevalence, risk, and aggravating factors of chronic venous illness in the general Greek population, which showed that more than half of the study sample is of normal weight. However, most of the studies regarding the results of this study's Body Mass Index (BMI) analysis showed that more than two thirds of the analysed sample were overweight or obese, which may be related to poor eating patterns and an increase in the obesity rate (Ali et al, 2019).

According to the job positions, kitchen crew has the highest prevalence of VVs with 44.4% and the lowest is service crew, with 11.1%. Both store manager and food vendors has prevalence of VVs with 22.2%, Barista shows no VVs. Unfortunately, there aren't enough research studies to compare the job positions of fast food workers. However, prevalence of VVs among fast food workers in different job positions may varies due to the nature of each job position. Years of working experiences as fast food workers with VVs has mean years of 4.3 and standard deviation of 2.3 year, range from 2 to 10 years.

This study results corroborate a study about the risk factors for varicose veins in hairdressers. Increased years of experience were revealed to be a significant risk factor for developing varicose veins by Chen & Guo (2014).

Additionally, another study has explained on the majority of their participants were middle-aged, nonsmokers, and had a normal BMI of less than 25, which had an impact on the overall pathogenesis of VV and suggested a tendency for occupational factors to be stronger predictors for the development of VV in a particular population (Albader et al., 2020).

Fast food workers who work for 2 shifts has 33.3% of prevalence while work for 1 shift has 66.7% of prevalence. Prevalence of VVs among fast food workers who work for 5 to 6 days is 55.6%, which is the highest, followed by both 3 to 4 days and 7 days of work, with similar prevalence, which is 22.2%. According to the result from a study among nurses with VVs, the prevalence of VVs according to numbers of shifts (working days) per week has a mean and SD of 5.3 days; 3.7 days per week (AlBader et al., 2020). The previous and the current study's findings have demonstrated that more workdays per week have a significant prevalence of VVs. In this current study, fast food workers who stand for 6 to 9 hours has highest prevalence of VVs with 66.7%, followed by standing for more than 9 hours with 22.2% and least is 4 to 6 hours with 11.1%. A study investigated those nurses, who had to stand at work for a longer period of time were more likely to have varicose veins with a majority of nurses with varicose veins stood for four to five hours each day (Shakya et al., 2020). The prevalence of VVs is 66.6% for fast food workers who sit for less than an hour

and 33.3% for those who sit for between one and two hours in this study. It is clear that fast food workers won't be seated for longer than two hours, which suggests that their nature of job involves more standing than sitting.

The highest prevalence of VVs is among fast food workers who carries weights of 20 to 23 kg with 44.4%, while carry weights more than 23 kg has 22.2% of prevalence, followed by 5 to 10 kg, less than 5 kg and not carrying any weights has similar prevalence, which is 11.1%. A study done in Riyadh has reported that the prevalence of VVs among nurses who lifted heavy weights is 82.1% (AlBader et al., 2020). In a different study by Ali et al. (2022), they found that nurses who lift objects weighing more than 23 kg frequently have a high rate of varicose veins: (68.4%), which is consistent with the findings of the present study.

Prevalence of VVs is identified in relation to lifestyle variables. Non cigarettes or vape consumer has 77.8% of prevalence of VVs while current cigarettes or vape consumer has 22.2%. According to a research by AlBader et al., (2020), only 10.0% of smokers had VVs, which supports current study's findings. Thus, prevalence of VVs among smokers is significantly low. Fast food workers who have not practicing physical exercise per week has higher prevalence of VVs compare those who exercise less than 4 times per week, which is 88.9% and 11.1% respectively. According to Dalboh et al. (2020), they reported that the prevalence of VVs among teaches who did not practice sports or physical exercise per week was 65.8%. The other studies' result also shown that prevalence of VVs among those who are sedentary is higher than

those who practice sports. Fast food workers who are diagnosed with VVs use tight stockings during activity has 44.4% of prevalence of VVs compared to those who did not, which is 55.6%. This study also shown that majority of the fast food workers who had not been diagnose with VVs did not use any tight stockings during activity. This has proven that there is low awareness of the use of tight stockings to prevent VVs and worsening of VVs.

5.3 Association between VVs and its risk factors among fast food workers in Cheras

5.3.1 Association between Age and VVs

According to this study, age group from 21 to 30 years old is the most common age group to develop VVs with a prevalence of 33.3%. Nevertheless, there is no significant association between age and VVs, ($p = 0.60$) by using Fisher's exact test. In the current study by Elamrawy et al. (2021), a controversy shown that age was discovered to be an independent predictor of LLVV. In other study by Ziegler et al. as cited in Elamrawy et al. (2021), age was not a risk factor for varicose veins in the investigation. Another study done by Ali et al. (2022) also suggest that there is no significant association between age and VVs ($p = 0.101$).

5.3.2 Association between Gender and VVs

The prevalence of VVs is determined to be 33.3% of male fast food workers, and 66.7% of females fast food workers. However, fisher's exact test shows that there is no significant association between gender and VVs ($p = 0.17$). This study has similar findings with a study done by Elamrawy et al. (2021), reporting that gender were not associated with risk of lower limb VVs or no sex dependent difference in lower limb varicose veins.

5.3.3 Association between ethnicity and VVs

The result of this study shows highest prevalence of VVs among different ethnicities is Chinese, which is 55.6%, followed by Malay with 22.2%, both Indian and Kadazan Dusun are 11.1%; Myanmar do not have any prevalence of VVs. Fisher's exact test result shows that there is no significant association between ethnicity and VVs ($p = 0.47$). The result is not consistent with a study done by Ali et al. (2022), found that 88.2% of nurses with varicose veins were Arabian, compared to 10.5% Asian and just 1.3% African, indicating that ethnicity was a risk factor for varicose veins. However, due to the fact that the number of participating nurses varied greatly by ethnicity, these results were invalid and could not be deduced. In a study done by AlBader et al. (2020), they also reported that ethnicity had no significant association with VVs ($p > 0.05$).

5.3.4 Association between level of body weight and VVs

According to level of body weight (classified according to BMI) in this study, the highest prevalence is among fast food workers with normal (<= 24.9) body weight. The other body weight categories are overweight (=29.9) and obesity (>30), with respective prevalence rates of 22.2% and 11.1%. Fast food workers who falls under the category of underweight (= 18.5), there are no VVs. Fisher's exact test shown that there is no significant association between level of body weight and VVs ($p = 0.84$). However, many studies on VVs had proven that there is a significant association between BMI and VVs. According to the study done by Ebrahimi et al. (2015), the estimated crude odds ratio revealed a strong correlation between rising BMI and varicose vein prevalence. Obesity and weight gain are well-known risk factors for varicose veins, according to numerous research.

5.3.5 Association between social status and VVs

The prevalence of VVs among fast food workers who are married is 66.7%, which is twice higher than the singles, with 33.3%. According to Albader et al. (2020), the study found that there was a correlation between VVs and socioeconomic status, which might be explained by the idea that marriage may unintentionally increase the incidence of VVs in women because of multiparity. Fisher's man test has shown that there is a significant association between social status and VVs ($p = 0.03$). According to AlBader et al. (2020),

bivariate associations showed an association between the VVs and social status that was statistically significant (p=0.02).

5.3.6 Association between years of working experience and VVs

Years of working experiences as fast food workers with VVs has mean years of 4.3 and standard deviation of 2.3 year, range from 2 to 10 years. Univariate analysis test revealed that there is no significant association between years of working experience and VVs (p = 0.99). However, there was a study shown that there was an association between VVs and years of working experience. Increased years of experience were revealed to be a significant risk factor for developing varicose veins by Chen & Guo (2014).

5.3.7 Association between working days per week, shifts per day and VVs

Fisher's exact test has shown that there is no significant association between working days per week and VVs (p = 0.31). Fisher's exact test has shown that there is no significant association between shifts per day and VVs (p = 0.54). There is a similar study done by AlBader et al. (2020), numbers of shifts per week were not significantly associated with VVs (p> 0.05). However, long working hours were found to be an occupational risk factor that was significantly linked with lower limb VVs (X2 = 131.9, p0.000) (Mahmood et al., 2021).

5.3.8 Association between hours of standing and sitting and VVs

Fisher's exact test has shown that there is no significant association between hours of standing and VVs ($p = 0.72$). On the other hand, Fisher's exact test also shown that there is no significant association between hours of sitting and VVs ($p = 0.90$). There is a similar study done by AlBader et al. (2020), hours of standing or sitting at work were not significantly associated with VVs ($p > 0.05$). However, numerous studies has proven that there is significant association between long standing hours and VVs. It was discovered that workplace standing position was an independent predictor of LLVV. The majority of research suggest that prolonged orthostasis caused by work positions may enhance the prevalence and severity of LLVV; employees who worked in prolonged standing positions had a significantly greater prevalence of varicose veins (Elamrawy et al., 2021). However, this study results does not prove their associations.

5.3.9 Association between weights lifted at work and VVs

Fisher's exact test has shown no significant relationship between weights lifted and VVs ($p = 0.32$). However, many studies has proven that there is an association between weights lifted at work and VVs. Lifting heavy objects and working longer hours are risk factors for VV because the increased pressure on the lower limbs causes vascular wall and valvular damage (AlBader et al., 2020). Further studies should determine its associations among fast food workers.

5.3.10 Association between cigarettes or vape consumer and VVs

Fisher’s exact test has shown no significant relationship between cigarettes or vape consumer and VVs ($p = 1.0$). Although there are conflicting data, smoking is thought to increase the chance of developing venous insufficiency (Dalboh et al., 2020). According to Dalboh et al. (2020), smoking and varicose veins were not associated in their study, which also has similar findings with Lee et al. where there was no association between the two (odds ratio = 0.15; 95% CI 0.05-0.44).

5.3.11 Association between physical exercise per week and VVs

Fast food workers who have not practicing physical exercise per week has higher prevalence of VVs compare those who exercise less than 4 times pre week, which is 88.9% and 11.1% respectively. Fisher’s exact test has shown no significant association between physical exercise and VVs ($p = 0.46$). In both the Yun et al. and Elamrawy et al. study as cited in Elamrawy et al. (2021), there was no link between routine physical activity and the development of LLVV was discovered. Thus, this study's findings were consistent with those of the two earlier studies. Contrarily, consistent exercise was proven to be a protective factor in other research. The various results may be the result of how the phrase "regular exercise" was defined in the research. In a study by Dalboh et al. (2020), it was shown that participants who regularly exercised for at least

3 hours per week had a decreased likelihood to develop varicose veins than those who exercised only sometimes or not at all (P = 0.0001). The muscles in the lower limbs, particularly the gastrocnemius, which has a strong pumping motion, gain strength from physical activity. Additionally, consistent exercise helps to maintain a healthy blood flow, preventing venous stasis.

5.3.12 Association between VVs and its comorbidities

There is no significant association between family history and VVs (p = 0.15). According to Elamrawy et al. (2021), numerous studies have linked a familial history of varicose veins to a negative association which has similar findings with their findings. This has been similar to our current study. Additionally, several research discovered an association between varicose veins and a positive family history (Elamrawy et al., 2021). There is no association between CAD and VVs (p = 1.00). There is no CAD among fast food workers who are diagnosed with VVs. There is no significant association between CAD and VVs. There is no association between kidney disease and VVs (p = 1.00). There is also no significant association between history of leg trauma and VVs (p = 0.31). In addition, there is a significant association between hypertension and VVs (p = 0.03). The prevalence of lower limb varicose veins was dramatically increased by having hypertension (Ebrahimi et al., 2015). A few studies have looked towards how hypertension affects varicose veins, but the validity of their findings is questionable (Ebrahimi et al., 2015). For this association to be verified, more research is required (Ebrahimi et al., 2015). Varicose veins are, nevertheless, associated to hypertension,

according to some research (Ebrahimi et al., 2015). Besides, there is a significant association between constipation and VVs (p = 0.01). There is also a significant association between DM and VVs (p = 0.00). Lastly, there is also a significant association between RA and VVs (p = 0.06). Further studies should investigate its association among fast food workers. According to Ali et al. (2022), their study had proven that the deep vein thrombosis, hypertension, chronic constipation, diabetes, kidney disease, rheumatoid arthritis, coronary artery disease, and severe occupational injury to the lower limbs were the comorbidities associated to varicose veins (p = 0.001, p = 0.002, p = 0.006, p = 0.006). There is a similarity of findings from their study and this current study.

5.4 Medical intervention of VVs among fast food workers diagnosed with VVs

Among 9 of the fast food workers who are diagnosed with VVs, only 4 received medical treatment with 44.4%. The types of medical treatment received by the fast food workers are conservative management which are medications and physiotherapy, 1.5% and 0.5% respectively. The role of physiotherapist in patient's education is essential to help patients to understand the importance of lifestyle modification among patient with VVs (Zhang & Melander, 2014). Long term use of drugs will impair a person's thinking and judgement and increase their risk of suffering infectious diseases, becoming addicted, driving while impaired, and having an adverse pregnancy outcome (U.S. Department of Health and Human Services., 2022). There is still a lack of medical literature to support the use of diuretics (Jones & Carek, 2008).

5.5 Signs and symptoms among fast food workers who are not diagnosed with VVs

Fast food workers who have not yet been diagnosed with VVs have reported on their symptoms and signs of the disease, as well as any potential risk factors. Additionally, this will raise their level of VV awareness. Pain, lower leg heaviness, fatigue, swelling, agitation, a burning or prickling feeling, soreness, and spasms are a few possible symptoms (Aslam et al., 2022). The prevalence of the sign of worm- like appearance in dark blue purple colour among the participants is 26.6% within the total of undiagnosed VVs fast food workers. Prevalence of continuous pain and swelling is 31.8%, prevalence of

worsened pain after standing more than 4 hours is 43.2% and prevalence of itching and burning sensation over the worm like appearance area is 20.8% among the total of 192 participants who are not diagnosed with VVs. A cross-sectional study done in Pakistan found that the clinical symptoms of VVs were lower leg pain (59%), lower leg heaviness (43%), nocturnal spasms (34%), swelling (29%), pins and needles (20%), burning (19%), and tingling (15%) (Aslam et al., 2022).

5.6 Limitations

It is acknowledged that several limitations are present in the current study. Firstly, the small sample size is one of the study's drawbacks. Secondly, the investigation of changes in varicose veins over time was not possible because of the cross-sectional design. Thirdly, in this study, it is limited to learn about the individuals' lifestyles and workout routines. Fourthly, since both risk variables and varicose veins were examined at one point in time in this cross sectional investigation, causality cannot be proven. In addition, because participants self-reported how often they spent standing, they may have underestimated or inflated how much time they spent standing, particularly if they were aware of their illness condition. Furthermore, because fast food employees are the targeted participants, there is a time limit for them to complete the online questionnaire because they are only available during their little break period. Asking them to complete the questionnaire during the busiest times of each meal is much more difficult. Additionally, some fast food employees had trouble understanding each question due to language problems.

Moreover, self-reporting was used for the diagnosis of VV, which could be biased.

5.7 Suggestions and Recommendations

As there is little information on the frequency of VVs within this targeted community, future research on these populations of fast food workers in Malaysia and elsewhere should have been conducted. If fast food employees' jobs are connected risk factors, this should be looked into. In order to obtain more thorough, precise, and comprehensive data to identify the risk factors on it, a greater area and sample size may be taken into consideration in the future. Medical intervention including surgical and conservative managements of VVs may also done in future studies.

The Malaysian Physiotherapy Association may also conduct a campaign discussion about varicose veins in the future to raise awareness among people, particularly those whose jobs force them to stand for long periods of time. During the sessions, there are advises on how physiotherapy can be used to prevent and treat varicose veins, as well as how patient education can be encouraged and carried out. As a result, varicose vein prevalence may decline in the coming years. Each fast food employee is advised to wear tight stockings with their outfit. In order to enhance blood circulation, stretching of calf muscles is also advised during regular breaks from work. A medical check up is also suggested to those who have any signs and symptoms of VVs.

Lastly, it is recommended that the duration for commencement of research can be increased to a longer period. This is because there is a lot of restriction in terms of selection of research design and method if the period for data collection is only 3 to 4 weeks. When longer duration is provided to the students, it is believed that the quality of research project implemented can be increased.

5.8 Fundings

The expenses and cost that used up throughout this research study are all self-sponsored.

CHAPTER 6

CONCLUSION

In conclusion, the prevalence of VVs among fast food workers in Cheras, Selangor is 4.5% among the total sample size of 201 participants. In terms of gender, female are more prone to have VVs than in male. Age group from 21 to 30 has the highest prevalence of VVs. Among the ethnicities, Chinese has the highest prevalence of VVs. Normal weight (<= 24.9) has highest among the category of BMI. Social status under married has higher prevalence than singles. Years of working experiences among the fast food workers has mean of 4.3 years and SD of 2.3 years. The more the working shifts per week and longer shifts per day, the higher the prevalence of VVs. 6 to 9 hours of standing at work and < 1 hour of sitting has highest prevalence of VVs. Non cigarettes or vape consumer is unexpectedly has higher prevalence of VVs than non cigarettes or vape consumer. A sedentary lifestyle and use of tight stockings has high prevalence of VVs. Weights lifted with 20 to 23 kg has highest prevalence of VVs. In addition, the results of Chi square or Fisher's exact test has found the significant association between VVs and social status, hypertension, constipation, diabetes mellitus, and rheumatoid arthritis. However, further studies are needed to support its associations.

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APPENDIX A – ETHICAL APPROVAL FORM

UNIVERSITI TUNKU ABDUL RAHMAN
Wholly Owned by UTAR Education Foundation (Company No. 578227-M)

Re: U/SERC/224/2022

4 November 2022

Mr Muhammad Noh Zulfikri Bin Mohd Jamali
Head, Department of Physiotherapy
M. Kandiah Faculty of Medicine and Health Sciences
Universiti Tunku Abdul Rahman
Jalan Sungai Long
Bandar Sungai Long
43000 Kajang, Selangor

Dear Mr Muhammad Noh,

Ethical Approval For Research Project/Protocol

We refer to your application for ethical approval for your students' research project from Bachelor of Physiotherapy (Honours) programme enrolled in course UMFD3026. We are pleased to inform you that the application has been approved under Expedited Review.

The details of the research projects are as follows:

No	Research Title	Student's Name	Supervisor's Name	Approval Validity
31.	Association of Postural Awareness with Sedentary Behavior and Back Pain During the Hybrid Study Among Undergraduate Students	Low Xin Yuen	Mr Martin Ebenezer Chellappan	
32.	Impact of Social Media Addiction on Physical Activity Among Undergraduate Students	Mak Kai Nan		
33.	Tibial Torsion and Leg Length Discrepancy in Idiopathic Scoliosis Among UTAR Students	Khoo Wan Qi	Pn Nadia Safirah Binti Rusli	
34.	Prevalence of Patellofemoral Pain Among University Students	Khoo Wen Han		
35.	Prevalence of Varicose Veins Among Fast Food Employees in Cheras, Selangor: A Cross Sectional Study	Ropheca Phuah Su Hui		
36.	The Effect of Unstable Modified Wall Squat on Dynamic Balance Among Recreational Athletes	Chu Sin Jiet	Mr Sathish Kumar Sadagobane	
37.	Knowledge, Perception, and Attitude Towards Breast Cancer and Breast Self-Examination (BSE) Among Non-medical Private University Students	Foo Jes Mynn		
38.	Perception, Knowledge and Attitude Towards the Impact of Daytime Nap on the Risk of Stroke Among Non-Healthcare Undergraduate Students: A Cross-Sectional Study	Chan Chi Kuan	Mr Tarun Amalnerkar Co-Supervisor:	4 November 2022 –

Should the students collect personal data of participants in their studies, please have the participants sign the attached Personal Data Protection Statement for records.

Thank you.

Yours sincerely,

Professor Ts Dr Faidz bin Abd Rahman
Chairman
UTAR Scientific and Ethical Review Committee

c.c Dean, M. Kandiah Faculty of Medicine and Health Sciences
Director, Institute of Postgraduate Studies and Research

3/4

APPENDIX B – INFORMED CONSENT FORM

Prevalence of Varicose Veins among fast-food workers in Cheras, Selangor: a cross sectional study.

Dear participants,

Good day! You are invited to participate in a research conducted by **ROPHECA PHUAH SU HUI** (Student ID: 1901939), a Year 3 Trimester 2 student currently pursuing **Bachelor of Physiotherapy (Hons)** in Universiti Tunku Abdul Rahman, Sungai Long Campus.

The objective of this study is:

- to determine the **prevalence of varicose veins** among fast-food workers in Cheras, Selangor.
- to identify the **associated risk factors of varicose veins** among fast-food workers in Cheras, Selangor.

You are welcome to complete this research questionnaire if you are:
1. Fast-food workers who work at fast-food restaurants/stalls/vendors in Cheras, Selangor.
2. No history of lower leg venous disease before working as fast-food workers.

This questionnaire consists of 4 sections, and you are required to complete all of the sections as below:
(1) Demographic data
(2) Work-related
(3) Lifestyle
(4) Health-related

This questionnaire will only take around **5 - 10 minutes** to complete all 4 sections as stated above.

There is no risk from being part of this research. However, you are able to increase awareness on varicose veins.

Kindly be reminded that all of the information and data collected in this research will be kept in confidential at all times. Your participation in this research study should be completely voluntary. If you feel discomfort to answer some of the questions, you preserve the right to withdraw from the study at any time.

If you have any enquiries on this research study, kindly contact me, **ROPHECA PHUAH SU HUI** at **010-2512012 or suhui2001@gmail.com.**

Your help is greatly appreciated, Thank you!☺

---

* Required

1. **Eligibility Criteria** *

   Do you meet any of the criteria listed below? If no, you may proceed to next section.
   Exclusion criteria:

   - *Currently pregnant*

   Mark only one oval.

   ◯ Yes (Sorry, you do not meet the eligibility criteria of this research. You may proceed to submit this questionnaire. Thank you for your participation)
   ◯ No

APPENDIX C – PERSONAL DATA PROTECTION NOTICE

PERSONAL DATA PROTECTION STATEMENT

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.

[redacted]

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.

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 us at suhui2001@gmail.com

2. Acknowledgement of notice *

Mark only one oval.

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

3. Signature in the format of: 'electronically s/d Nickname or surname'. *
E.g.: electronically s/d Phuah

_____

APPENDIX D – KERCJIE AND MORGAN (1980) TABLE

Table for Determining Sample Size from a Given Population

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size.
S is sample size.

APPENDIX E – ONLINE QUESTIONNAIRE

Section I: Demographic data

4. Name
Optional

_____

5. Age *
in years

Mark only one oval.

- 16 - 20
- 21-25
- 26-30
- 31-35
- 36-40
- 41-45
- 46-50
- 51-55
- 56-60
- > 60

6. Gender *

Mark only one oval.

- Male
- Female

7. Ethnicity *

Mark only one oval.

- Malay
- Chinese
- Indian
- Other: _____

8. Height *
in cm

_____

9. Weight *
in kg

_____

10. Social status *

Mark only one oval.

- Single
- Married
- Widow/ widower
- Divorcee

11. Job scope/ position *

_____

12. Months/ Years of working *

_____

Section II: Work related

Meaning of word:

- *Shift* = work time/ shift work*

13. On average, how many shifts* do you have per day? *

1 shift = 8 hours

Mark only one oval.

- 1
- 2
- 3

14. On average, how many working day(s) do you have per week? *

Mark only one oval.

- 1 - 2
- 3 - 4
- 5 - 6
- 7

15. How many hours do you stand per working day? *

Mark only one oval.

- < 1
- 1 - 2
- 2 - 4
- 4 - 6
- 6 - 9
- > 9

16. How many hours do you sit per working day? *

Mark only one oval.

- < 1
- 1 - 2
- 2 - 4
- 4 - 6
- 6 - 9
- > 9

17. How much weights (in kg or L) do you usually lift/carry during work-time? *

Mark only one oval.

- None
- < 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 23
- > 23

18. If you do carry weights, is there any external mechanical devices/ assistance (e.g. Loading machine) to assist you in carrying the weights?

Mark only one oval.

- Yes
- No

Section III: Lifestyle

Please refer the meaning of phrases at the most bottom of this section.

19. Have you ever smoke/vape? *

Mark only one oval.

- ◯ Yes, and I'm a current smoker/vaper*
- ◯ Yes, but I'm an ex-smoker/vaper*
- ◯ I'm non-smoker/vaper*

20. How often do you practice sports or physical exercise*? *

Mark only one oval.

- ◯ none
- ◯ < 4 times per week
- ◯ > 7 times per week

21. Do you wear tight stockings during activity? *

Mark only one oval.

- ◯ Yes
- ◯ No

22. If the above answer is yes, does the stockings provided by the restaurant?

Mark only one oval.

- ◯ Yes
- ◯ No

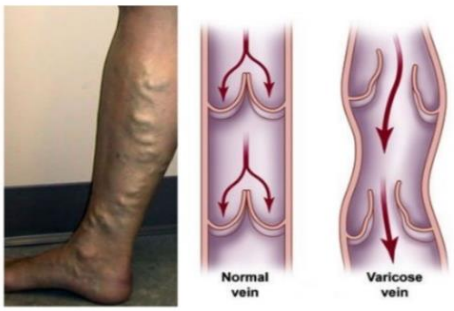
Meaning of phrases:

1. *current smoker/vaper* = still smoking at least one cigarette daily for as long as 1 year; still vaping at least one vape in 3 weeks for as long as 1 year.*
2. *ex-smoker/vaper* = quit smoking/vaping for at least 6 months prior to the date of this survey questionnaire.*
3. *non-smoker/vaper* = never smoked/vaped; smoked/vaped less than one pack/vape per month or 20 packs/vapes in your whole life.*
4. *Physical exercise*= exercising for 150 min of moderate intensity aerobic physical activity throughout the week as running, walking, swimming, or spinning*

Section IV: Health related

What is Varicose Veins?
Varicose veins of lower legs (calf /ankle/feet area) are visible, tortuous, and dilated veins of the superficial venous system, typically larger than 3 mm, due to the pooling of blood.

Example picture of varicose veins:



23. Have you ever been diagnosed with varicose veins? *
Since working as a fast-food worker

Mark only one oval.

- ◯ Yes *Skip to question 24*
- ◯ No *Skip to question 28*

[redacted]

Section IV: part 1

You may continue this section if you are diagnosed with varicose veins.

24. Does the varicose veins present in one or both of your lower legs (calf/ ankle/ foot)? *

Mark only one oval.

- ◯ One
- ◯ Both

25. Have you ever received any medical treatment of varicose veins? *
Since working as a fast-food worker

Mark only one oval.

- ◯ Yes *Skip to question 26*
- ◯ No *Skip to question 32*

Continue from previous question.

26. What medical treatment have you received? *
can choose more than one

Check all that apply.

- ☐ Sclerotherapy
- ☐ Ligation and stripping
- ☐ Endovenous LASER ablation
- ☐ Medications
- ☐ Physiotherapy
- ☐ Other: _____

27. Does the varicose veins reappeared after any operation? *
*answer this only for those who undergo operation

Mark only one oval.

- Yes
- No

Skip to question 32

Section IV: part 1

You may continue this section if you are not diagnosed with varicose veins.

Do you have any **symptoms of varicose veins** as below?

28. I can see dilated, twisted, elongated and bulging worm-like appearance in dark purple or blue colour in my calf/ankle/foot. *

Mark only one oval.

- Yes
- No

29. I am able to feel a very bad and continuous pain, and swelling in my calf/ankle/foot. *

Mark only one oval.

- Yes
- No

30. I have experienced a worsened pain over my calf/ankle/foot after standing for more than 4 hours in a day. *

Mark only one oval.

- Yes
- No

31. I feel itching and/or burning sensation around the worm-like appearance structure in my calf/ankle/foot. *

Mark only one oval.

- Yes
- No

Section IV: part 2

Kindly mark the appropriate answers from the following statements below.

Please refer the meaning of medical terms at the most bottom of this section.

32. Does anyone of your family members have been diagnosed with varicose veins? *

Mark only one oval.

- Yes
- No

33. Have you ever been diagnosed with deep vein thrombosis (DVT)*? *

Mark only one oval.

- Yes
- No

34. Have you ever been diagnosed with coronary artery disease (CAD)*? *

Mark only one oval.

- ◯ Yes
- ◯ No

[redacted]

35. Do you have any hypertension/ high blood pressure? *

Range of high BP is equal to or more than 130/80 mmHg

Mark only one oval.

- ◯ Yes
- ◯ No

36. Have you ever experienced infrequent bowel movement or difficult passage of stools that persists for weeks at a time? *

Mark only one oval.

- ◯ Yes
- ◯ No

37. Do you have any diabetes where your blood sugar is too high? *

Mark only one oval.

- ◯ Yes
- ◯ No

38. Do you have any kidney disease or kidney failure? *

Mark only one oval.

- ◯ Yes
- ◯ No

39. Have you ever been diagnosed with rheumatoid arthritis*? *

Mark only one oval.

- ◯ Yes
- ◯ No

[redacted]

40. Have you ever had a history of leg trauma? *

E.g. sprains, strains, fractures, or joint dislocation

Mark only one oval.

- ◯ Yes
- ◯ No

Meaning of medical term:

1. DVT*= *A medical condition that occurs when a blood clot forms in a deep vein. These clots usually develop in the lower leg, thigh, or pelvis*
2. CAD*= *Heart disease caused by plaque buildup in the wall of the arteries that supply blood to the heart (called coronary arteries)*
3. Rheumatoid arthritis*= *Long-term condition that causes pain, swelling and stiffness in the joints.*

APPENDIX F – VALIDATION FORM

Kindly please evaluate the questionnaire for the study stated above to establish its validity. You are required to assess using the scale stated below, please tick it through the boxes given below. We would be grateful and appreciative, if you could leave your insightful comments and recommendations in the space provided in the last section, "Comments and suggestions".

Scale	Interpretation	Description
5	Very high valid	The questionnaire is valid and can provide unbiased data for the investigation, allowing 0-5%
4	High valid	The questionnaire is valid and can provide unbiased data for the investigation, allowing 8-10%
3	Valid	The questionnaire is valid and can provide unbiased data for the investigation, allowing 11-15%
2	Less valid	The questionnaire is valid and can provide unbiased data for the investigation, allowing 16-20%
1	Not valid at all	The questionnaire is valid and can provide unbiased data for the investigation, allowing 21-25%

Indicators	1	2	3	4	5
The indicators in the questionnaire consistently and accurately measure each variable of the investigation					
The questionnaire fits with the variables under investigation, thus measuring what it intends to measure					
The questionnaire has the capability to measure items of variables within a given time frame					
The questionnaire has the ability to distinguish the characteristics or the properties of differing attributes of the subjects under study					
The questionnaire has the ability to gather factual data, eliminating biases and subjectivity					
Quick and complete data can be generated by the questionnaire within the time frame allowed to obtain the data					
The questionnaire has no influence on the variables being measured					
The questionnaire is framed in a clear, simple, in order to avoid risk of error					
The questionnaire is capable of generating data that will be of value and practical use to the sectors concerned in the investigation					

APPENDIX G – TURNITIN

THESIS ROPHECA

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