KNOWLEDGE REGARDING RISK FACTOR AND PREVENTION STRATEGIES OF OSTEOPOROSIS AMONG HOSPITAL ATTENDANTS IN HOSPITAL UNIVERSITI SAINS MALAYSIA

By

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ABSTRACT

Osteoporosis is a worldwide health concern for individuals of both male and female which increases significantly with age without symptoms. The aim of this study was to determine the knowledge of risk factor and prevention strategies of osteoporosis among hospital attendant in Hospital Universiti Sains Malaysia (Hospital USM). A cross sectional study was used a self- administered questionnaire. A total of one hundred and one participants were involved in this study by using non-probability sampling. Data were collected from December 2014 to February 2015 using assessment tools and analysed using SPSS version 20.0 for frequency ,percentage, mean ,standard deviation and *p*-value .Results of 96(95%) showed that participants had higher knowledge score regarding risk factor of osteoporosis (M=1.95,SD=0.22). Meanwhile similar with the prevention strategies that reported had higher prevention strategies which was 61(60.4%), (M=1.60, SD=0.49).This study found that there is a significant difference between knowledge of risk factors among male and female (p =0.005) meanwhile for knowledge regarding prevention strategies showed that there were no significant (p =0.757) differences between male and female. More than that, there was no relationship between risk factor and prevention strategies of osteoporosis among participants. Thus, intervention regarding risk factor and prevention strategies should be identified as well as other intervention to prevent from the other complication in the future.

PENGETAHUAN TENTANG FAKTOR RISIKO DAN PENCEGAHAN STRATEGI OSTEOPOROSIS DALAM KALANGAN ATENDAN HOSPITAL DI HOSPTAL UNIVERSITI SAINS MALAYSIA

ABSTRAK

Osteoporosis adalah satu kebimbangan kesihatan di seluruh dunia dalam kalangan lelaki dan perempuan yang mana peningkatan ini ketara dengan usia tanpa simptom.Tujuan kajian ini adalah untuk menentukan pengetahuan faktor risiko dan pencegahan strategi osteoporosis dalam kalangan atendan hospital di Hospital Universiti Sains Malaysia (Hospital USM).Kajian keratan rentasi ini menggunakan soal selidik yang dibuat sendiri .Seramai seratus satu orang peserta telah terlibat dalam kajian ini menggunakan sampel bukan keberangkalian .Data dikumpulkan dari Disember 2014 hingga Februari 2015 menggunakan alat-alat penilaian dan dianalisis menggunakan SPSS versi 20.0 untuk mendapatkan kekerapan, peratusan, purata, sisihan piawai dan nilai standard *p*. Sebanyak 96 (95%) peserta melaporkan mempunyai pengetahuan yang lebih tinggi mengenai faktor risiko osteoporosis dengan (M = 1.95, SD = 0.22) . Sementara itu, peserta kajian juga sama melaporkan mempunyai pengetahuan yang tinggi dalam strategi pencegahan iaitu 61 (60.4%) dengan (M = 1.60, SD = 0.49) .Kajian ini mendapati bahawa terdapat perbezaan yang signifikan antara pengetahuan tentang faktor-faktor risiko antara lelaki dan perempuan ($p = 0.005$) Sementara itu untuk pengetahuan mengenai strategi pencegahan menunjukkan bahawa tidak ada perbezaan yang signifikan ($p = 0.757$) antara lelaki dan perempuan.Lebih daripada itu,tidak terdapat perkaitan antara faktor berisiko dan strategi pencegahan dalam kalangan peserta. Oleh itu, langkah-langkah mengenai faktor risiko dan strategi pencegahan perlu dikenal pasti serta langkah lain untuk mencegah dari komplikasi yang lain pada masa akan datang.

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Osteoporosis is a silent disease (Schrader et al., 2005). The World Health Organization (WHO) defines osteoporosis as a bone mass measurement more than 2.5 standard deviations below the standardized young adult mean. For each standard deviation decrease in measured bone mineral density, the risk of fragility fractures doubles (Nichols et al., 2000). Osteoporosis goes undiagnosed due to loss of bone happens without any symptoms until a fragility fractures suddenly occur (Khorsandi, Hasanzadeh, & Ghobadzadeh, 2012). In Asian population, osteoporosis is more prevalence than western population due to lower body mass index and shorter in height (Atoosa Soleymanian et al., 2104).

According to WHO on 2004, osteoporosis causes more than 8.9 million fractures annually worldwide and also ranks high among disease that cause people to become bedridden with serious complications. From a statistics in figure 1.1, osteoporosis is the second disease that may give burden of disability to the population as well as in elderly (Johnell &J Kanis. 2006). These complications may be life-threatening. When the prevalence of osteoporotic fractures increase, life expectancy expected to be low. The current rise in the aging population and gains in the lifespan, it give significant to the economic impact (Korpi et al., 2014).

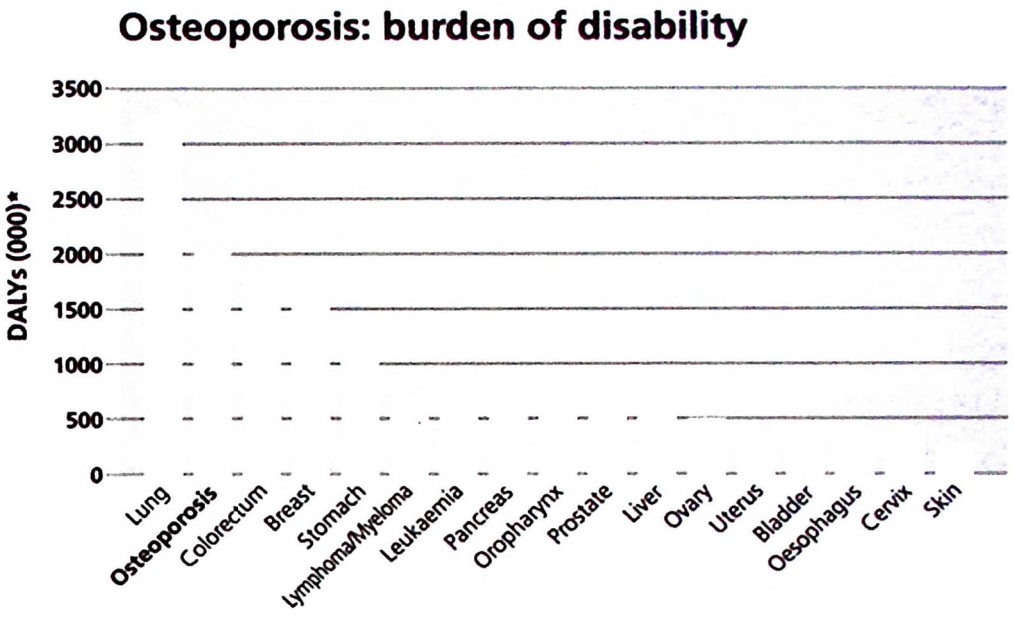

Figure 1.1 Osteoporosis: Burden of Disability

Data analysis had showed the life time is risk at 50 years of age for any osteoporotic fracture ranges between 40-50% in women and 13-22% in men which considered very high (Dontas & Yiannakopoulos, 2007). It is estimated that one in four men older than age 50 years will suffer an osteoporosis Although the prevalence of osteoporosis is lower in men than in postmenopausal women globally, the mortality and morbidity of osteoporosis among men are higher than among women (Chiu et al., 2013).Meanwhile for women, 80% of those affected by osteoporosis (NOF,2004). It is due to the smaller bone structure in women than men, hormonal changes during ageing process in women and several lifestyles factors such as diet pattern, exercise that increase women risk factor for this disease (NOF, 2004).

1.2 Problem Statements

Osteoporosis is responsible for more than 1.5 million fractures annually in this country with the most prevalent being hip, vertebral, and wrist fractures (Curry & Hogstel, 2002).There have been studies about the risk factors of osteoporosis among elderly Asian people, but there still paucity of information on the risk factors of this disease among elderly in Asian (Assantachai et al., 2006). While in determining what are the risk factors to osteoporosis and prevention strategies, there are poor specificity and sensitivity for future prediction especially in Asian (Shin et al., 2010).

Osteoporosis has enormous psychosocial, physical, and economic consequences. From the psychosocial effect, disability is occurring as result of fracture especially more on hip fracture. Some of the patient with hip fracture, after recovery cannot walk properly and mortality are become high. Low income result of economic consequences has been associated with inadequate intake of nutrients, low education level and a lack of health knowledge in Indian female (Shatrugna et al., 2005).

Loss of independence for at least a third of people with osteoporosis due to hip fractures and vertebral fractures lead to height loss, chronic pain and difficulty in normal life activities (Poole & Compston, 2006). Fracture risk is much higher in the elderly than in the young and increases steeply with the age after 75 years (Poole & Compston .2006).A study show that low bone mass can predict future fracture risk and when there are an increasing gradient of fracture risk resulting with the bone mass decrease especially in female than male. Studies shows that peak bone mass that is the maximum bone mass achieved during adulthood of early thirties and rate of bone loss are the major determinant of future risk factor of osteoporosis (Voort et al., 2000). The quality of life also is reduced by associated pain, fear, disability and the loss of independence regarding osteoporosis (Christodoulou Cooper, 2003).

In spite of that, elderly also should know the problems that should be overcome in the occurrence of future fractures. To help prevention of osteoporosis and fractures, the most important strategy is preventive of osteoporosis by the maximisation of peak bone mass by optimising factors that influence the skeletal development during the childhood and adolescents. Small adult skeletal size recognised as risk factor of osteoporosis (Prentice, 2004).

1.3 Research Objectives

1.3.1 General Objective

To determine the knowledge of risk factor and prevention strategies of osteoporosis among hospital attendants in Hospital Universiti Sains Malaysia.

1.3.2 Specific Objectives

1. To identify the level of knowledge regarding risk factors and prevention strategies of osteoporosis among hospital attendants in Hospital USM.

2. To compare the level of knowledge of osteoporosis risk factors among male and female hospital attendants in Hospital USM.

3. To compare the level knowledge of osteoporosis prevention strategies among male and female hospital attendants in Hospital USM.

4. To determine the relationship between (age, gender, marital status and level of education) with knowledge regarding osteoporosis risk factor and prevention strategies among hospital attendants in Hospital USM.

1.4 Research Questions

1. What is the level of knowledge regarding risk factors and prevention strategies of osteoporosis among hospital attendants in Hospital USM?

2. Is there any difference between male and female of Hospital USM attendant's knowledge level regarding osteoporosis risk factors?

3. Is there any difference between male and female of Hospital USM attendant's knowledge level regarding osteoporosis prevention strategies? .

4. What is the relationship between demographic characteristics (age, gender, marital status and level of education) with level of knowledge regarding osteoporosis risk factor and prevention strategies among hospital attendants in Hospital USM?

1.5 Hypothesis

Null Hypothesis, Ho1: There is no significant difference between male and female of Hospital USM attendant's with level of knowledge regarding osteoporosis risk factor

Actual Hypothesis, HA1: There is a significant difference between male and female of Hospital USM attendant's with level of knowledge regarding osteoporosis risk factor

Null Hypothesis, Ho2: There is no significant difference between male and female of Hospital USM attendant's with level of knowledge regarding osteoporosis prevention strategies.

Actual Hypothesis, HA2: There is a significant difference between male and female of Hospital USM attendant's with level of knowledge regarding osteoporosis prevention strategies.

Null Hypothesis, Ho3: There is no significant relationship between demographic characteristics (age, gender, marital status and level of education) with level of knowledge regarding osteoporosis risk factor and prevention strategies among hospital attendants in Hospital USM.

Actual Hypothesis, HA3: There is a significant relationship between demographic characteristics (age, gender, marital status and level of education) with level of knowledge regarding osteoporosis risk factor and prevention strategies among hospital attendants in Hospital USM.

1.6 Definition of Terms

Knowledge Knowledge is information, understanding or skill that you get from the experience or education. Knowledge applies to facts or ideas acquired by study, investigation, observation, investigation or experience, rich in the knowledge of human nature (Merriam Webster, 2014). In my study, knowledge regarding risk factor and prevention strategies by using the simple questionnaire.

Osteoporosis Osteoporosis is characterized by reduction in the strength and density of bone tissue, which leads to increased bone fragility and susceptibility to fracture. It is referred to as a "silent disease" because bone loss occurs without any overt symptoms. In fact, most people are not aware of their condition until they experience a fracture .In my study, osteoporosis was examined among elderly.

Risk factors Risk factors are any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease. For example, in my study ,risk factors that can be eliminated or reduced through lifestyle or behavioural changes include tobacco smoking, physical inactivity and poor diet nutrition. Demographic risk factors are include age, sex and population subgroups .Sex was very important risk factors in osteoporosis.

Prevention strategies

The term "prevention" is reserved for those interventions that occur before the initial onset of disorder. In my study, participants need to know the prevention of osteoporosis to prevent from osteoporosis such as in nutritional intake, lifestyle and others.

Hospital Attendants

Hospital attendance is a physician who act a member of a hospital staff, admits and treats patients and may supervise or teach staff and students. In my study, hospital attendances give many contribution to the hospital itself such as help stuff nurse do the job such as in supervise the hospital area and in managing the hospital patients.

1.7 Significance of the Study

In Malaysia ,osteoporosis is a major health burden but there are less preventive and curative therapy done especially for the elderly people but primary prevention of the disease through increased awareness of risk factors and preventive behaviours as potentially important to role in (Stacie, 2001).These is to decrease the burden associated with the disability. In this study, hospital attendants give role as a care giver to patient in hospital as nurse but they do not have basic knowledge as nurse had course .So they need some information regarding osteoporosis to prevent from osteoporosis in future.

The information that can be obtained from this study will provide a structural basis for the educational preventive programs as well as giving realized to hospital attendant about osteoporosis risk factors and prevention for the population of elderly male and female knowledge regarding age, sex ,race, menopause status, family history of osteoporosis as well as, use of caffeine and alcohol, inadequate calcium intake, thin or body frame and lack of weight-bearing activity may be important to prevent from osteoporosis (Suzanne et al., 2005).These unmodifiable and modifiable risk factor for osteoporosis among hospital attendant need to be assess as it play an important role to prevent from osteoporosis.

It is also important in knowledge among male and female hospital attendant to improve nutritional status such as adequate calcium intake, take vitamin D supplementation; physical activity should be maximizing, reducing smoking and avoiding alcohol consumption. Moreover, in prevention of elderly risk of falling, it is important to measures such avoidance of loose drug, improvement in lighting, correction of deficits in vision and hearing, avoidance of sedative drugs and hip protectors among compliant nursing home residents will all help.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

A review of the literature shows that knowledge by itself is not enough to take a preventive action toward male and female. In this chapter cover more detail about the knowledge regarding risk factor and the prevention strategies of osteoporosis. From the definition of osteoporosis, physiology of osteoporosis, knowledge regarding peak bone mass and knowledge regarding risk factors. There are various modifiable and non-modifiable risk factors that influence the amount of peak bone mass one acquires and retains. Besides, bone assessment technique also play an important role in prevention of osteoporosis. Knowledge about osteoporosis is important contributors to osteoporosis preventive behaviour. Relationship between demographic data and level of knowledge regarding risk factor and prevention strategies can be assess at the end of the study.

2.2 Definition of osteoporosis

Bone tissue having decreased bone mass and also structural deterioration is the osteoporosis characterization (Hsu, Chen, & Tsauo., 2014).This metabolic bone disease may cause bone or skeletal fragility and potentially increased risk of serious fractures as well as a major importance problem in socially and economically (Leboime et al., 2010). Most of the individuals do not know they have the condition until after they suffer a fracture. In term of preventing osteoporosis, it is important to reach peak bone mass while bones are still growing so that bones are as strong as possible. For both male and females, this peak bone mass happens during adolescents, hence achieving peak bone mass early in life is essential (Mahan & Escott-Stump,2008)

2.3 Physiology of osteoporosis

Male and female bone integrity is determined by several factors including bone morphology, mineral accrual and attainment of peak bone mass. For boys, pre-pubertal period in boys is longer by several years compared to girls. That is why adult males have longer appendicular bones than females (Korpi-steiner, Milhorn, & Hammett-stabler, 2014).Dynamic condition of bone involved in three phrases which are growth, modelling and remodelling. Growth in bone length occurs by a process called

endochondral bone formation that involves two steps which first is cartilage tissue is added to the growth plates of bones located at the proximal and distal ends of long bones and secondly cartilaginous scaffold is transformed into bone tissue in the adjacent metaphyses (Schoenau et al., 2004). Modelling and remodelling occur through bone deposition and resorption by bone cells, known as osteoblasts and osteoclasts. Osteoclast and osteoblast play an important role in bone process. A group of osteoclasts remove a small quantity of bone tissue followed by the replacement of new bone by osteoblasts (Schoenau et al., 2004).

The cells that are responsible for breaking down old bone known as osteoclasts live longer. When the osteoclasts life span are longer , it gives them more tendency to break the bone ,disrupting the balance between bone resorption and new bone formation and lead to bone loss (Wayne, 2002). It is usually occur more in female than male. In a normal healthy adult, skeletal bone resorption should equal skeletal bone formation to maintaining a healthy skeleton. Osteoporosis develops when bone resorption is greater than bone formation.

In spite of that, osteoblasts play important role in bone process formation. It is very important in the regulation of extracellular matrix mineralization and controlling of remodelling of bone. The concept that the activation and regulation of bone resorption requires an interaction between osteoblasts and osteoclasts (Neve, Corrado, & Cantatore, 2011).Approximately 10% of the skeleton is replaced annually through bone reformation (Rosenberg, 2005). In men, estrogen is a major regulator of bone (N. Korpi-Steiner et al., 2014).Cross-sectional finding that free and bioavailable fractions of estradiol and testosterone down in aging males which is likely attributed to an increase in sex hormone-binding globulins (N.Korpi-Steiner et al., 2014).These findings support that oestrogen plays an important and perhaps in regulating BMD in elderly men.

2.4 Knowledge regarding peak bone mass of osteoporosis

The most crucial risk factors for osteoporosis are the amount of peak bone mass acquired during bone development and the amount of bone mass lost during the aging process (Mahan & Escott-Stump, 2008).Bone structure and peak bone mass are greatly affected by lifestyle factors ,especially during adolescents and young adults age (Wayne, 2002).So, from childhood, male and female should know about the knowledge regarding peak bone mass. As example usually adults will reach their peak bone mass at

age 35.At this stage, bone are strong and dense (Wayne, 2002).After this stage, usually female will lose 0.5% to 1% of their bone mass. Bone mass also reduced due to ovaries stop producing oestrogen.

In spite of that, difference appears to be essentially due to a more prolonged bone maturation period in males than in females, with a larger increase in bone size and cortical thickness. Puberty affects bone size much more than the volumetric mineral density. That is why for male, the tendency to get osteoporosis is lower due to long time of attainment of peak bone mass A study had showed that the lower the bone mineral density (BMD) ,the higher risk for fracture at an older age (Voort et al., 2001).For female with normal BMD had lower fracture risk than osteoporotic female. Older female with osteoporosis may lead to higher risk for falls due to increase impairment in balance and muscular strength (Christodoulou & Cooper, 2003). Female have a lower peak bone mass than male (J Kim's Lim et al., 2008).After menopause, female more prone to have bone loss and increased for falls compared to male over the age of 65 years old.

A prospective study from Australia showed that high body sway with the combination of low BMD result a higher risk for fracture. The risk fracture for hip is greater by the factor of falls such as strokes, dementia, vertigo and others (Practice , 2002).

2.5 Knowledge regarding risk factors of osteoporosis

There are a number of genetic, hormonal, mechanical and dietary factors that contribute to bone mass accrual during puberty (Rizzoli, 2006).Non-modifiable or conventional risk factors include genetic factors, gender, family history, ethnic, background and age (Ali & Siktberg, 2001).Thyroid hormone, growth hormone, insulin like growth factors and sex steroid production are the hormone that is needed for normal skeletal growth of a person whether male or female (Bachrach, 2001). Hormonal factors are one of the gender differences that affect female. History of osteoporosis from family main important risk factor of osteoporosis in male and female. A study showed that gender is the second clinical risk factor for female more prone to get osteoporosis due to loss of oestrogen hormone (Wayne, 2002).

Bone health must be a lifelong concern with special focus on the adolescent years (Schettler & Gustafson, 2004). There are significant differences in skeletal size and structure between male and female that involved in differences in fracture incidence, location and outcomes. The prevalence of fracture is higher for the males than the females of which smoking, low milk intake and alcohol intake are the most dominant. In females, changes in appetite may occur due to menopause such as gustatory changes as well as physiological and psychological changes such as depression So, to prevent it, from the childhood should have enough nutrition to get strong bone As a result the nutritional status of them may be impaired regarding to micronutrient insufficiency .micronutrient such as metalloenzymes of certain proteins involved in collagen synthesis and skeletal structure formation are essential for bone density maintenance (J Kim's Lim et al., 2008).

Besides, some study show that postmenopausal hormone replacement therapy are greatly protects against loss in bone density (Hannan et al., 2000).But long term glucocorticoid therapy inhibits the formation of new bone by causing kidney to excrete calcium, decrease the absorption of calcium intake in the intestine (Peterson, 1999).More recent attention has focused on adolescents and young female who stop menstruating for extended periods especially the female triad athlete which is characterized by disordered eating pattern (Jean, Cynthia, & Katherine, 2004). Bone mass is reduced and increased risk of osteoporosis in women with secondary amenorrhea. Among females, non-user of hormone replacement therapy (HRT), low milk intake and less frequency of walking slopes are the most dominant risk factors In late menarche the peak bone mass is reduced (Christodoulou & Cooper, 2003).

Among female especially before the age of 45 is a strong determinant of bone loss and increased risk of fracture. The risks of osteoporosis are increases with age are the non-modifiable risk factor. Fifty –five percent of Americans over the age of 50 years are the suspected people to have low bone mass and also are at risk for developing osteoporosis(Jean et al., 2004). Modifiable risk factors for osteoporosis include diet, exercise, and lifestyle habits such as in taking calcium intake, weight-bearing exercise, cigarette smoking and alcohol consumption. Diet and physical activity can contribute to the health of bone by promoting bone formation until an individual reaches peak bone mass (PBM). Usually after reaches the peak bone mass, bone begins to break down faster than new bone can be formed.

Therefore it is critical for individuals to engage in physical activity and consume a calcium-rich diet during adolescence and maintain these behaviours for life. Experts believe that if young female engage on that, they can increase their bone mass by as much as twenty percent. This is essential in protecting them against the osteoporosis problem (National Osteoporosis Foundation, 2009). Calcium intake is very important during adolescents in the prevention of osteoporosis. Ali and Siktberg (2001) said that adolescents' females consume inadequate calcium and engage in behaviours in such similarly to contribute to decreased calcium intake such as skipping meals, dieting, and consuming soft drinks daily. It was proven that in study women who took calcium supplementation regularly would be have lower incidence of osteoporosis (Lim, 2005). It is essential for individuals to become aware of the importance that vitamin D and calcium have on bone health (Lanham-New et al., 2007). Calcium and vitamin D are two of the major bone forming nutrients. An adequate supply of calcium, along with vitamin D is essential at all stages of life for a strong skeleton (Swann, 2012).

During adolescents is a critical time for peak bone acquisition (Jean, Cynthia & Katherine, 2004). In retrospective studies stated that adequate calcium intake during childhood and adolescence was associated with a lower incidence of osteoporosis in postmenopausal female (Steelman & Zeitler, 2001). A report state that osteoporosis can be reduced through nutrition and adequate calcium intake as much as 50% during adolescence when peak bone mass is optimized.

In addition to lack of dietary calcium, adolescents today are also living a much more sedentary lifestyle. By weight-bearing exercise, bone can be mobilized and has weight-bearing function well (Turner, 2000).Their regular vigorous weight bearing physical activity have been replaced with increased time spent using the computer, playing video games, and watching television (Bachrach, 2001).The body's ability to maximize bone mass during childhood and adolescents decrease as well as lack of vigorous weight-bearing physical activity (Kohrt, Bloomfield, Little, Nelson, & Yingling, 2004).

In a meta-analysis of bone mineral accrual in adolescents revealed that those who participated in physical activity such as running or jumping will have high bone mineral content (BMC) than controls and as much as 11% higher bone mineral density (BMD) at specific sites (Hind & Burrows, 2007).Weight-bearing activity performed 3 to 4

times a week for 35 to 45 minutes per session has been shown to increase and preserve bone density for men and female (Stacie, 2001). However, men do not think osteoporosis is something they need to be concerned about, and many do not know their risk for the disease and fail to engage in preventative behaviours.

Other than that, for male, they tend to have heavy in smoking or tobacco used. Heavy smoking associated with greater risk of osteoporosis. It is because it may decrease in the mineralization of bones and decrease bone healing process (Wayne, 2002). Smokers lose cortisol bone about 50 percent faster than do not smokers. Hannan et.al (2000) found that although current smokers lost more bone mineral density than men who do not smoker, there were no difference between female smokers and non-smokers.

2.6 Bone Assessment Technique related to osteoporosis

The most widely used method to test bone mineral measurement called dual-energy x-ray absorptiometry (DXA). This assessment technique is quick and accurate The radiation exposure is low and relatively safe (Baroncelli & Saggese, 2000 & Gordon, 2003). DXA can measure the central skeletal sites as well as peripheral sites, and can also assess whole body composition. DXA technology measures the transmission of x-rays of two different photon energies through the body. The attenuation of these transmitted energies depends on the composition of the tissues through which the beam passes. A detector measures the energies passing out of the body, and computer-calculated values of Bone Mass Content (BMC) and Bone Mass Density (BMD) are reported (Steelman & Zeitler, 2001).

Screening for osteoporosis has been valuable asset to prevent complications with decreases bone density. According to World of Organization, BMD score as normal (-1.0 or greater), osteopenia (less than -1.0 and greater than -2.5) or osteoporosis (less than -2.5). Prevalence of low bone mass also associated with the age ranges. Prevalence of osteoporosis by femoral neck or lumbar spine BMD using Dual X-ray Absorptiometry (DXA) reported 33 % in female older than 60 years, while in this research reported that 17% of female over 60 years could be at risk of having osteoporosis and other study showed prevalence of osteoporosis to be 50% in female age 70 years old.

2.7 Knowledge regarding prevention strategies of osteoporosis

Osteoporosis prevention strategies have most often been aimed at bone loss prevention in adults, rather than promoting maximal bone growth in childhood and adolescence (Schrader et al., 2005). Knowledge and prevention strategies are of particular importance for people in relation to osteoporosis. Current research suggests that adequate bone building in childhood and adolescence is the key to osteoporosis prevention (Schrader et al., 2005). To have adequate bone building, lifestyle should be changes. These include improving in nutrition that is adequate calcium intake, vitamin D supplementation, physical activity should be maximizing, reducing smoking and avoiding alcohol consumption.

Through dietary sources like dairy products and vegetables can be increasing the amounts of calcium that should first be achieved. Vitamin D play an important role in maintaining bone health and also helping with the absorption of calcium (NOF,2010).Other than that, it is essential in balance and muscle performance. Sources of vitamin D included cereals, egg yolks, salt water fish and others. Inadequate supply of vitamin D can give impact to bone health despite of deficiencies (Stetzer, 2011).

Calcium is the most abundant mineral in the human body and is essential in most body processes. The body's preferred source of calcium is dietary, which can only be absorbed in its ionized form. Vitamin D plays an essential role in this process. Without sufficient dietary calcium and vitamin D, maximum bone mineral accrual will not occur. Insufficient dietary calcium intake results in bone resorption thus maintaining calcium homeostasis. Young adults aged 21 to 35 needs 12 to 15 mg of calcium per kilogram of body weight per day. Up to 75% of dietary calcium can be absorbed during periods of growth (KassWolff, 2004).Knowledge regarding this should be known by male and female. It is because some of them did not concern about this from childhood. However, male do not think osteoporosis is something they need to be concerned about, and many do not know their risk for the disease and fail to engage in preventative behaviours (Kasswolff, 2004).

They determined that 1500 mg of calcium a day was needed for the two year period surrounding peak bone mass accrual for female and 1700 mg of calcium daily was required for male. Further, the dietary analysis done during this study indicated that adolescents were actually consuming less than the calculated amount of calcium

required. Female was found to average less than 900 mg of dietary calcium per day, and male' intakes averaged 1000 mg of dietary calcium per day (Whiting et al., 2004).

Morever,weight bearing exercise defined by the National Osteoporosis Foundation as exercises in which bones and muscles work against gravity as the feet and legs bear the body's weight (NOF, 2010).This include jogging, stair climbing, walking and others. Clinical data shown that in adolescents, exercise may not just only increase bone density but also prevent from osteoporosis in the future. A meta-analysis of random controlled trials on 2010 found statistically significant that regular weight- bearing exercise can result in increased bone strength by up to 8% in children and adolescents (Nikander et al., 2010).

Male indicated higher health motivation and perceived self-efficacy to change exercise behaviour than female. On the other hand, female perceived fewer barriers to calcium intake than did male. Factors, such as health beliefs, motivation, and self-efficacy are known to be integral aspects of health promotion. The result also having similar finding for premenopausal women with improves agility, strength and balance (Peris et al., 2006). Other than that, female prefer medical attention for the prevention of bone loss, but male were referred because of the presence of signs and symptoms indicating a more severe disease (Chiu et al., 2013).

Information regarding differences between perceptions of men and women may help healthcare providers target health-promoting interventions to improve bone health. More than that, supportive therapy such as analgesia, physiotherapy, hydrotherapy and proper orthopaedic management in those with hip fracture especially are the treatment for patient with osteoporosis (Christodoulou & Cooper. 2003).

However, treatment of osteoporosis not only depend on supportive measures and surgery only ,but therapeutic agents play an important action to prevent further bone loss and reduce of risk new fracture. Antiresorptive agents acts as decreasing bone resorption and decrease the fracture risk even in elderly (Cohen & Roe, 2000).With these, it is an important preventive strategy about the maximisation of peak bone mass by optimising factors that influence the skeletal development during the childhood and adolescents. Small adult skeletal size recognised as risk factor of osteoporosis (Prentice, 2004). Current research suggests that adequate bone building in childhood and adolescence is the key to osteoporosis prevention (Schrader et al., 2005).

Despite this, osteoporosis prevention strategies have most often been aimed at bone loss prevention in adults, rather than promoting maximal bone growth in childhood and adolescence (Schrader et al., 2005). If it does not overcome may lead to future fracture risk. When the nurses know about the risk factor and prevention of osteoporosis, the nurse can plan the nursing care with the best practice so that the quality of life for patient will be care as prevention is better than cure.

2.8 Relationship between demographic characteristics with level of knowledge and prevention strategies regarding osteoporosis

The age of the participants determines which is more likely and thus where attention should be focused in this study. For the sex differences, it will determines the factors that contributing to bone integrity during skeleton development and maintenance that may support lower fracture risk in males and females (Korpi-steiner, Milhorn, & Hammett-stabler, 2014). There is a significant correlation between educational level and knowledge about osteoporosis. Lacks of knowledge for female of lower educational level tend to be relatively high. Educational level may also have an effect on bone mineral density since there is relationship between educational level and reproductive factors such as pregnancy and lactation and other lifestyle factors (Gur, Sarac, Nas, & Cevik, 2004).

The association between marital life history and BMD net socioeconomic and behavioural factors known to influence bone mass. Evidence for a gender difference in the association between marital history and adult BMD. Marriage had provided female with improved economic security and male with emotional support (Miller-Martinez et al., 2014). There is a significant correlation between educational level and BMD. Losses in BMD for female of lower educational level tend to be relatively high, and losses in spine and femur BMD showed a decrease with increasing educational level.

2.9 Conceptual Framework

The Health Belief Model (HBM) was originally developed in the 1950s to explain why people did not try to prevent or detect disease (Glanz,Rimer &Viswanath,2008).For purpose of this study, the concepts from the HBM .The theoretical framework used for this study to describe osteoporosis knowledge in prevention strategies among hospital attendance in Hospital USM. It also used to explain and predict health-promotion behaviours and incorporated factors or variables that affect health behaviour. According to the HBM, a person who has certain knowledge will be more likely to engage in preventive strategies (Rosen stock, 1974).

Actually lifelong habits of eating and exercising are difficult to change, modifying them require a lot of confidence that once can alter such behaviours Therefore, to promote behavioural change, individuals must value the perceived effects of changed behaviours and believe that their current behaviours. More than that, individuals also must believe that their current behavioural styles cause threats to personal health. In addition, they must believe that a given action will result in a beneficial outcome at acceptable costs. Besides that, individuals must also value their own competence to perform the needed behaviour.

Perceived susceptibility is where participants need to believe that there is possibility to get osteoporosis if they do not have knowledge regarding osteoporosis. The greater they perceived risk, the greater the like hood of engaging in behaviours to decrease risk. Perceived barriers are obstacles the individual believes will prevent participants from making behaviour modification. For example, participants need to believe that the knowledge of risk factor and prevention strategies will affect their lifestyle to be better in future. They need to know that osteoporosis may give effect to their lifestyle if they did not take responsibility on it. Perceived severity is how bad the individual believes it would be if participants were to suffer from the disease (Glanz, Rimer &Viswanath, 2009).Perceived benefits is the individual belief in the efficacy of the advised action to reduce the risk of osteoporosis and in the cues of action is the promoting of information regarding osteoporosis knowledge of risk factors and prevention strategies.

The intervention in this study provided knowledge of osteoporosis aimed at increased perceived susceptibility is how likely one believes one will get to osteoporosis, perceived seriousness is how severe one believes it to be if osteoporosis occur, perceived benefits of calcium intake and weight-bearing exercise, perceived motivation and decreased perceived barriers to consume and perform weight bearing exercise (Glanz,Rimer &Viswanath,2008).

Osteoporosis is a disease that does not normally affect its victims until later in life. The HBM (Figure 1.2) provides a supportive conceptual framework to build a health education workshop around. The HBM showcases why someone would want to make a change to prevent osteoporosis, and how one can address all components of the model to increase someone's awareness about osteoporosis. By assessing the knowledge of osteoporosis of an adolescent's population, further osteoporosis educational materials can be produce. By increasing awareness and using goal setting, adolescents may become more confident in their abilities to prevent osteoporosis through their action.

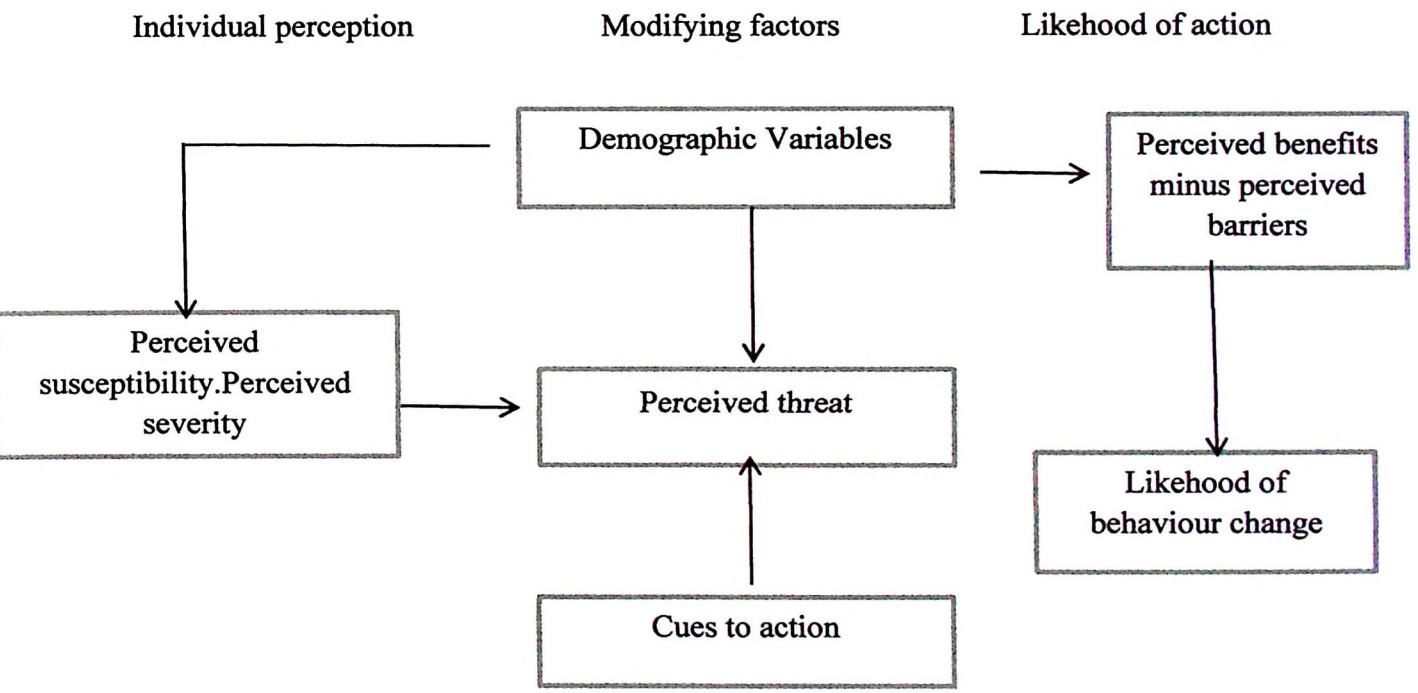

Figure 2.1: The variables in the Health Belief Model. Adapted from Rosen stock, et al., 1974. It is clear that the HBM focuses on avoiding disease rather than on achieving health. Rosen stock et al.,1974 noted that this was in part due to the difficulty in framing questions in terms of positive health.

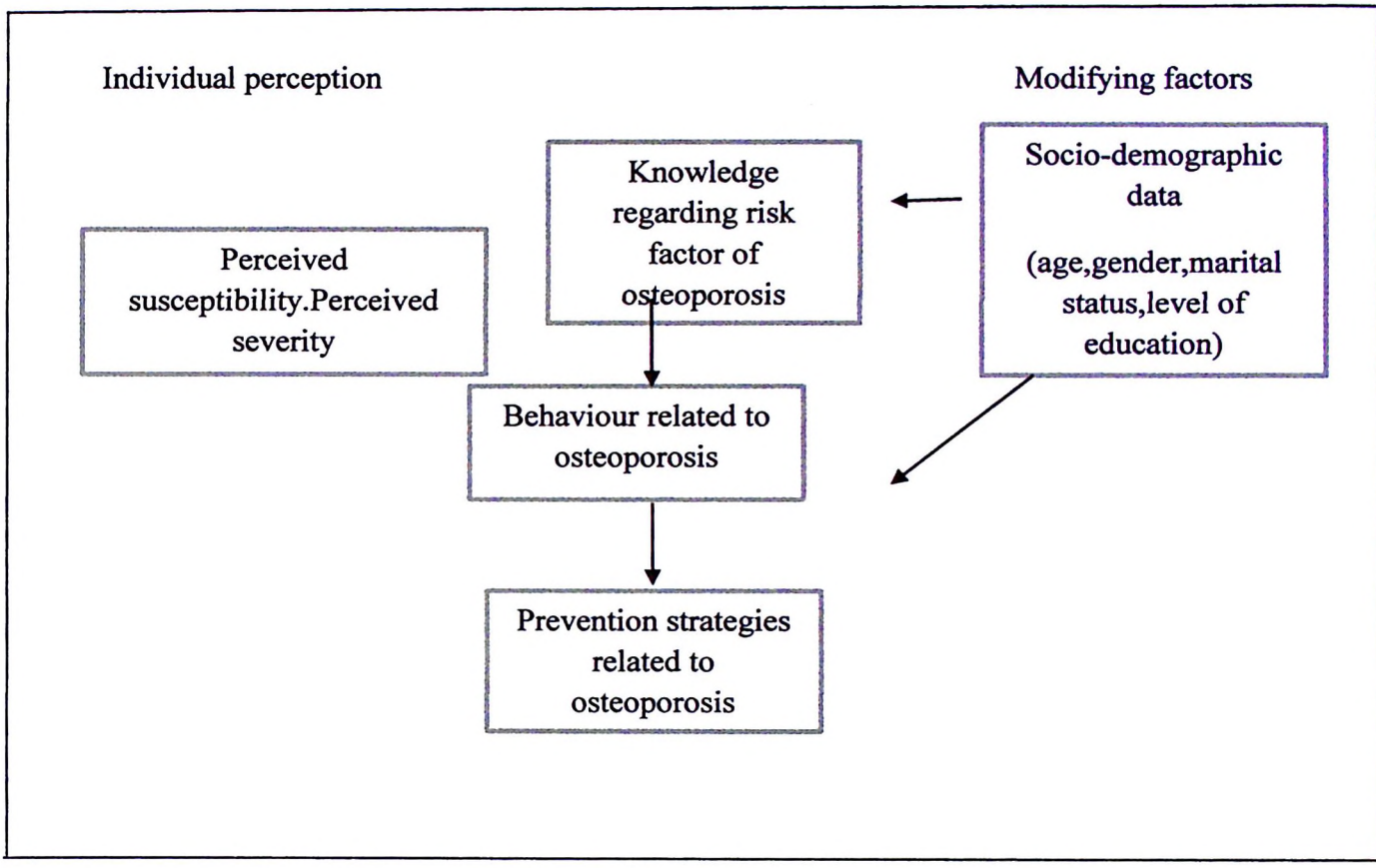

Figure 2.2: Conceptual Framework of Health Belief Model. It is regarding osteoporosis knowledge or risk factor and prevention strategies among hospital attendance in Hospital USM

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research Design

A cross-sectional research study design was used in to determine the knowledge regarding risk factor and prevention strategies in osteoporosis among hospital attendants in Hospital Universiti Sains Malaysia (Hospital USM). Data collection was conducted on December 2014 until February 2015.

3.2 Population and Setting

It was non-probability purposive sampling were from hospital attendants or 'Pembantu Perawatan Kesihatan'(PPK) of Hospital USM Kubang Kerian, Kelantan.

3.3 Sampling Plan

3.3.1 Sample

The inclusion criteria are as follows:

1. Participant were hospital attendants in Hospital USM
2. Participant with no history of osteoporosis
3. Age 25 until 40 years old
4. Participant who agreed to participate in research and sign the informed consent

The exclusion criteria are as follows:

1. Participant who have sight problem and unable to see properly.
2. Participant have problem with mental depression

3.3.2 Sampling Method

A non-probability purposive sampling was used to recruit the participants .Selection was based on they have particular characteristics that are of interest to the researcher. A number of inclusion criteria and exclusion criteria were used to control the homogeneity in this study.

3.3.3 Sample size

Sample size was calculated using the RAOSOFT Sampling Method .The researcher used Raosoft sample size calculation software to ensure the accuracy by avoiding sampling error during representatives and parameters of the sample .By entering all these value, the software were calculated the recommended sample size for the study.

$x = Z(c/100)2r(100-r)$

$n = N\,x/((N-1)E2 + x)$

$E = Sqrt[(N - n)x/n(N-1)]$

where N is the population size, r was the fraction of responses that you were interested in, and Z(c/100)was the critical value for the confidence level c.

The confidence level was 95% and a margin of error that can be tolerated amount was 0.05. The response distribution was 50%.

The actual population size was 187.Thus the recommended sample size for the participant from raosoft calculation was 126 and when 10% drop out for this study, the total participant was involved for this study was:

=126 +drop out 10%

=126+ 13

=139

3.4 Variables

3.4.1 Variable Measurements

The dependent variable in this study was the level of knowledge regarding risk factors and prevention strategies of osteoporosis among hospital attendants in hospital USM. For the level of knowledge regarding risk factor, participant needs to choose one best answer based of their knowledge. While for the five-point Likert scale on osteoporosis prevention strategies, participant need to tick one based on their knowledge also.

The independent variable were the ages, gender, marital status and level of education that included in sosio-demographic data. Adult bone mass may be influenced by stressors over the life course .The association between marital life history and BMD net socioeconomic and behavioural factors known to influence bone mass. Evidence for a gender difference in the association between marital history and adult BMD. Marriage had provided women with improved economic security and men with emotional support (Miller-Martinez et al., 2014). For the age, there are age between 25 to 40 which are age that ongoing of peak bone mass (Wayne, 2002).

3.4.2 Variable Scoring

The questionnaire comprised of 25 numerical measurements. For the numerical measurements, 15 questions were based on osteoporosis knowledge questionnaire developed by Winzenberg et al ., 2003. Participant had to choose either one item whether yes, no or do not know. Each item was coded 0 if an incorrect answer or a 'don't know' answer was given and 1 if the correct answer was given. For the range of score, 1-7 is considered low score and 8-15 considered as high knowledge. The potential score of 15.

While in osteoporosis prevention strategies questionnaire, consists of ten question, responses were on a five-point Likert type scale that ranges from strongly disagree (1 points) to strongly agree (5 point). It is simple to construct, to read and it was able to produce a highly reliable scale beliefs (Sayed-Hassan & Bashour, 2013). For the five-point Likert scale, the possible range of scores for each subscale is 6 to 30 with a possible total score range from 42 to 210. For the majority of the subscales, higher subscales about belief ,higher scores indicate more negative health beliefs (Sayed-Hassan & Bashour, 2013).

3.5 Instrumentation

3.5.1 Instrument

The self-administered questionnaires were on knowledge regarding risk factors and prevention strategies in osteoporosis among hospital attendants in Hospital USM. The osteoporosis questionnaire consists of two subscales: Part A consists of socio-demographic data and Part B consists of the knowledge regarding of risk factor and prevention strategies of osteoporosis among hospital attendants in Hospital USM.

Part A consist of four items which were information regarding age, gender, marital status and highest level of education .This information provides background about the participant and were used in order to determine the level of knowledge, to determine the differences of male and female and also the association between knowledge and prevention with demographic characteristics.

Part B is about the knowledge regarding risk factor and also prevention strategies of osteoporosis:

i) The osteoporosis knowledge questionnaire consists of 15 items regarding risk factor of osteoporosis. (Winzenberg, 2003).

ii)The preventive strategies to prevent osteoporosis consist of 10 items taken from the osteoporosis heath belief questionnaire (OHBM) with the author permission (Khorsandi et al., 2012).This questionnaire were adapted from osteoporosis health belief scale (OHBS) which was developed by Kim et, al, 2013 (Sayed-Hassan &Bashour, 2013).