



UNIVERSITI PUTRA MALAYSIA

***EFFECTS OF OSTEOPOROSIS EDUCATION INTERVENTION ON
KNOWLEDGE, BELIEF AND SELFEFFICACY AMONG FEMALE
ACADEMICIANS IN A PUBLIC UNIVERSITY IN MALAYSIA***

SAMIA AMIN

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By

SAMIA AMIN

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in Fulfillment of the Requirements for the Degree of Doctor of Philosophy**

February 2018

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

EFFECTS OF OSTEOPOROSIS EDUCATION INTERVENTION ON KNOWLEDGE, BELIEF AND SELFEFFICACY AMONG FEMALE ACADEMICIANS IN A PUBLIC UNIVERSITY IN MALAYSIA

By

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February 2018

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Faculty : Medicine and Health Science

Background: Osteoporosis is a global health problem which not only causes increase economic burden, but also leads to social, physical and psychological consequences. It is chronic health problem which is characterized by decreased bone mass density, micro architectural deterioration of bone tissue and fragility fractures, particularly to the hip, spine, wrist and shoulder. It is a silent undiagnosed disease until a fracture occurs due to an accidental fall. Worldwide osteoporosis causes more than 8.9 million fractures annually, resulting in an osteoporotic fracture every 3 seconds. Although it can affect either gender, 80% of those affected are women.

Objective: The objective of this study was to develop and evaluate the effect of an educational intervention based on Health Belief Model to improve knowledge, beliefs and self-efficacy regarding osteoporosis among female academician in Universiti Putra Malaysia.

Method: This study was single blinded randomized controlled trial. The study population was full time female academician in Universiti Putra Malaysia. Sampling unit was individual female academician in Universiti Putra Malaysia. A multi-stage random sampling was used. Female academic respondents of different faculties were randomized into intervention and control group. All female academicians were invited to participate in the study with informed consent form. Health Belief Model was used as theoretical framework. To measure Osteoporosis Knowledge Test (OKT), Osteoporosis Self- Efficacy Scale (OSES) and Osteoporosis Health Belief Scale (OHBS), data were collected on socio-demographic background, knowledge, beliefs and self-efficacy on osteoporosis. An educational intervention of three months duration

(12 weeks) was given with a follow up motivational sessions by telephone. The control group received the same educational intervention material after the completion of the study. To evaluate the effect of the intervention, data were collected at baseline, immediately, one month and three months after intervention for both groups. Descriptive and multivariate statistics (GLM) were used for analyzing the data using SPSS version 21 and the significance level was set at $P < 0.05$. In this study a per protocol analysis was done that included only those participants who completed the protocol for the intervention that they were originally allocated.

Result: Six hundred and twenty-four female academicians were screened at their respective faculties. Response rate was 91% at baseline. Finally, the number of participants during study period was 212 at baseline (114 in the intervention and 98 in the control), 201 immediately (108 in the intervention and 93 in the control), 193 at one month (103 in the intervention and 90 in the control) and 193 participants (103 in the intervention and 90 in the control group) who completed the three months post intervention assessment. The mean age of participants was 37.1 years (SD=7.2) and majority of them were Malay (84%), married (88%) with tertiary education (90%). After intervention, from baseline to three months follow up there was a significant increase in the mean score of knowledge (20.7 - 28.3, $p < 0.001$), beliefs (215.2 - 225.1, $p < 0.001$) and self-efficacy (22.4 - 25.9, $p < 0.001$). The GLM model was applied to detect the differences in change within and between groups for continuous data from baseline to three months follow up and controlling for baseline socio-demographic data. The results show a significant difference between groups ($F=173$, $p < 0.001$) and within groups for knowledge score ($F=1009$, $p < 0.001$); between groups ($F=8.403$, $p < 0.001$) and within groups for beliefs score ($F=13.806$, $p < 0.001$); between groups ($F=4.68$, $p < 0.001$) and within groups for self-efficacy score ($F=9.73$, $p < 0.001$). Time and group interactions were insignificant ($p = 0.221$).

Conclusion: These results provided evidence for the effectiveness of an educational intervention in promoting osteoporosis knowledge, beliefs and self-efficacy within female academician of University Putra Malaysia which suggests that increase knowledge on osteoporosis can improve exercise and calcium intake belief and self-efficacy even after three months of intervention, but policy should implement for long term intervention to sustain this effectiveness.

Key words: Osteoporosis, Knowledge, Belief, Self-Efficacy, Female Academician

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**KESAN INTERVENSI PENDIDIKAN OSTEOPOROSIS KEPADA
PENGETAHUAN KEPERCAYAAN DAN EFISIENSI DIRI DI KALANGAN
PEGAWAI AKADEMIK WANITA DI UNIVERSITI AWAM DI MALAYSIA**

Oleh

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Februari 2018

Pengerusi : Profesor Madya Hejar Abdul Rahman, M. Com. Health, PhD
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Latar belakang: Osteoporosis adalah masalah kesihatan global yang bukan hanya meningkatkan beban ekonomi, tetapi menjurus kepada kesan-kesan sosial, fizikal and psikologi. Ia adalah masalah penyakit yang kronik yang dikategorikan dengan penurunan ketumpatan jisim tulang, kemerosotan seni bina mikro tisu tulang dan keretakan kerapuhan, terutama pada pinggul, tulang belakang, pergelangan tangan dan bahu. Ia adalah penyakit senyap yang tidak didiagnosis sehinggalah terjadi kepatahan tidak sengaja. Osteoporosis di seluruh dunia menyebabkan lebih daripada 8.9 juta patah tulang setiap tahun, mengakibatkan patah tulang osteoporotik setiap 3 saat. Walaupun ia boleh menjejaskan semua jantina, 80% daripada mereka yang terlibat adalah wanita.

Objektif: Objektif kajian ini adalah untuk membangun dan menilai kesan intervensi pendidikan berdasarkan Model Kepercayaan Kesihatan untuk meningkatkan pengetahuan, kepercayaan dan keberkesanan diri terhadap osteoporosis di kalangan ahli akademik wanita di Universiti Putra Malaysia

Kaedah: Kajian ini adalah percubaan terkawal rawak tunggal. Penduduk kajian adalah ahli akademik wanita sepenuh masa di Universiti Putra Malaysia. Unit persampelan adalah individu ahli akademik wanita di Universiti Putra Malaysia. Pensampelan rawak pelbagai peringkat telah digunakan. Responden akademik dari fakulti yang berbeza dirawakan ke dalam kelompok intervensi dan kontrol. Semua ahli akademik wanita telah dijemput untuk mengambil bahagian dalam kajian ini dengan borang persetujuan yang dimaklumkan. Alat yang dipercayai dan sah yang disesuaikan daripada Model Kepercayaan Kesihatan telah digunakan. Untuk mengukur Osteoporosis Knowledge Test (OKT), Osteoporosis Self-Efficacy Scale (OSES) dan Osteoporosis Health Belief

Scale (OHBS), data mengenai latar belakang sosio-demografi, pengetahuan, kepercayaan dan keberkesanan diri terhadap osteoporosis dikumpulkan. Intervensi pendidikan selama tiga bulan diberikan dengan sesi motivasi dan susulan melalui panggilan telefon. Kumpulan kawalan menerima bahan intervensi pendidikan yang sama selepas selesai kajian. Untuk menilai kesan intervensi, data dikumpulkan pada permulaan, dengan serta-merta, satu bulan dan tiga bulan selepas intervensi untuk kedua-dua kumpulan. Statistik deskriptif dan multivariat digunakan untuk menganalisis data menggunakan SPSS versi 21 dan tahap kepentingan ditetapkan pada $p < 0.05$.

Keputusan: Enam ratus dua puluh empat ahli akademik wanita dipilih di fakulti masing-masing. Kadar respon adalah 91% pada tahap awal. Akhirnya, jumlah peserta semasa tempoh pengajian adalah 212 pada peringkat awal (114 dalam intervensi dan 98 dalam kawalan), 201 segera (108 dalam intervensi dan 93 dalam kawalan), 193 pada satu bulan (103 dalam intervensi dan 90 dalam kawalan) dan 193 peserta (103 dalam intervensi dan 90 dalam kumpulan kawalan) yang menyelesaikan penilaian intervensi selepas tiga bulan. Purata umur peserta adalah 37.1 tahun ($SD = 7.2$) dan majoriti mereka adalah Melayu (84%), berkahwin (88%) dan pendidikan tinggi (90%). Selepas intervensi, dari awal hingga tiga bulan susulan terdapat peningkatan yang signifikan dalam skor min pengetahuan (20.7 - 28.3, $p < 0.001$), kepercayaan (215.2 - 225.1, $p < 0.001$) dan keberkesanan diri (22.4 - 25.9, $p < 0.001$). Model GLM digunakan untuk mengesan perbezaan perubahan dalam dan antara kumpulan untuk data berterusan dan mengawal data sosio-demografi peringkat awal. Keputusan menunjukkan perbezaan yang ketara antara kumpulan ($F = 173$, $p < 0.001$) dan dalam kumpulan untuk skor pengetahuan ($F = 1009$, $p < 0.001$); antara kumpulan ($F = 8.403$, $p < 0.001$) dan dalam kumpulan untuk skor kepercayaan ($F = 13.806$, $p < 0.001$); antara kumpulan ($F = 4.68$, $p < 0.001$) dan dalam kumpulan untuk skor keberkesanan diri ($F = 9.73$, $p < 0.001$). Interaksi masa dan kumpulan tidak signifikan ($p = 0.221$).

Kesimpulan: Keputusan ini menunjukkan keberkesanan intervensi pendidikan dalam mempromosikan pengetahuan osteoporosis, keyakinan dan keberkesanan diri dalam ahli akademik wanita di Universiti Putra Malaysia, walaupun selepas tiga bulan intervensi, tetapi dasar perlu dilaksanakan untuk campur tangan jangka panjang untuk mengekalkan keberkesanan ini.

Kata kunci: Osteoporosis, pengetahuan, kepercayaan, keberkesanan diri, ahli akademik wanita

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I certify that a Thesis Examination Committee has met on 21 February 2018 to conduct the final examination of Samia Amin on her thesis entitled "Effects of Osteoporosis Education Intervention on Knowledge, Belief and Selfefficacy among Female Academicians in a Public University in Malaysia" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

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LIST OF ABBREVIATIONS

ACP	Average Congruency Percentage
BMD	Bone Mineral Density
CI	Confidence Interval
CVI	Content Validity Index
CVR	Content Validity Ratio
FFQ	Food Frequency Questionnaire
GLM	General Linear Model
IOF	International Osteoporosis Foundation
MOS	Malaysia Osteoporosis Society
MVPA	Moderate to Vigorous Physical Activity
OASKL	Osteoporosis Awareness Society of Kuala Lumpur and Selangor
OEP	Osteoporosis Educational Program
OHBS	Osteoporosis Health Belief Scale
OKT	Osteoporosis Knowledge Test
OSES	Osteoporosis Self- Efficacy Scale
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Osteoporosis is an alarming health issue worldwide which has severe economic burden which leads to social, physical and mental trauma (Wallace, Callachand, Elliott, & Gardiner, 2011; Khan, Sarriff, Khan & Mallhi, 2014). It is a chronic disorder of bone which is characterized by low bone mineral density, distortion of bone architecture. It causes severe pain and fragility fracture due to low bone mass. The most common fragility fracture due to osteoporosis occurs in pelvic area especially hip joint, spine, wrist joint and forearm. (Vaytrisalova, Kubena, Vleek, Palicka, Hala & Pavelka, 2007).

Worldwide 75 million people suffer with this disease and its related complications. Among this population, 10 million already diagnosed with this disease; 30 million has disease related complication and 34 million has low peak bone mass which is the most contributing risk factor to develop osteoporosis during their life time (Schuiling, Robinia, & Nye, 2011). Annually worldwide 8.9 million fractures occur, resulting in an osteoporotic fragility fracture in every 3 seconds (Johnell & Kanis, 2006). Fragility fracture increasing rapidly in developing and Asian countries including Malaysia (World Health Organization, 2012).

Globally the hip fractures rate rises due to osteoporosis. The World Health Organization projected that the fracture rate due to osteoporosis will escalate from 1.7 million in 1990 to 6.3 million by 2050 which mostly occur in developing countries (WHO, 2012). In Asia, osteoporotic fragility fracture will rise 51.1% by 2050 which was only 19.9% in year 1990 (Cooper, Campion & Melton, 2002; Paul & Natasja, 2011). Nearly 75% of all hip fractures occur in women (Cooper, Campion & Melton, 2002). In Malaysia, hip fracture due to osteoporosis among women and men was 218 and 88 per 100,000 population respectively (Lau et. al, 2001; Lee and Khir, 2007).

According to the World Health Organization (2012), osteoporosis is ranked second after cardiovascular disease which is the top disease in global health problem ranking. Prevalence of osteoporosis increased with age, and differed by gender, race and also varies from country to country; the highest priority among the countries of eastern Mediterranean region. The prevalence of osteoporosis in Iran was 22.2% but 55% in Pakistan (Lowe, Ellahi, Bano, Bangash, Mitra & Zaman, 2011). Other countries like Morocco was 31%, Egypt was 28.4%, Saudi Arabia was 23-24%, Bahrain was 27.1%, United Arab Emirates was 21.5% (International Osteoporosis Foundation, 2011) and in Turkey was 27-33.3% (Tuzun, et.al., 2012). In China, the prevalence of osteoporosis was 16.1%, Thailand was 12.6% and Taiwan was 10.08% Loh & Shong

(2007). The prevalence of osteoporosis in Malaysia was 24.1% (Lim, et. al., 2005) but no update data is available yet.

Osteoporosis is undiagnosed until an accidental fall occurs. Due to its silent nature, osteoporosis is detected as an incidental diagnosis (Barling, 2013). Osteoporosis has a genetic predisposition but some modifiable factors like smoking, alcohol consumption may cause osteoporosis. Positive family history increases the risk of development of osteoporosis (Berarducci, Keller & Lengacher, 2002). Race, ethnicity, gender, menopause, low level of estrogen are common important non-modifiable factors for osteoporosis. Small skeletal frame and lack of bone mineral density are also contributing factor of osteoporosis (Gemalmaz & Oge, 2008). Life style behavioral factors are also important etiological factors of osteoporosis such as low intake of calcium containing food, lack of sun exposure, sedentary work (Patil, Hasamnis, Jena, Rashid & Narayan, 2010). Lack of weight bearing exercises may lead to loss of bone mass which increases the chance of development of osteoporosis (Abrahamsen & Vestergaard, 2009).

Both morbidity and mortality are high in osteoporosis (Malaysian Osteoporosis Society, 2012; Brewer, Kelly, Donegan, Moore & Williams, 2011; Koh & Ng, 2002). Treatment cost for fracture leads to economic burden to individual which leads to poor mental health, sadness or even severe depression. Quality of life become suppressed almost about 52% in hip fracture in first 12 months and 21% after 2 years. In comparison, spinal fracture has less suffering than hip fracture which is 20% in first 12 months and 15% after 2 years (Sattui & Saag, 2014; Ganda, Puech & Chen, 2013). By considering the consequences of osteoporosis on physical, social and mental health, an aggressive action should be taken for prevention of osteoporosis in community level by health promotional activity.

Osteoporosis has severe economic burden in health care sector because billions of dollars are asserted for cost of osteoporosis treatment in each year (Johnell & Kanis, 2006). In 2013, it was estimated that treatment cost for fracture related to osteoporosis was USD 19 billion which is forecasted to increase to USD 131.5 billion by 2050 in United States and Canada (National Osteoporosis Foundation of United States, 2013). Approximately RM 22 million (USD 4.41 million) spent for the treatment of hip fracture in Malaysia; this figure did not include in long term rehabilitation care (National Orthopedic Registry Malaysia, 2009; Loh & Shong, 2007). So, huge cost of treatment causes great economic burden in healthcare sector of Malaysia. Apart from financial burden, human cost is enormous; patient lost their individual life, dependent on direct or indirect treatment or rehabilitation care. Therefore, immediate action must be taken before it became the economic threat to Malaysia. Thus, osteoporosis and osteoporosis-related fractures prevention will be important in controlling future health costs.

Due to the asymptomatic nature of osteoporosis, female who are the most crucial cohort than men, may sometimes even did not notice the progression of the disease until there is an accidental fall occur (IOF, 2013). Osteoporosis is common in both gender, but 80% cases affects women (Cooper, Campion & Melton, 2002). So, primary prevention strategies should target women (Tung & Lee, 2006). Therefore, health education is very important to prevent the incidence of osteoporosis. It is important to increase awareness of osteoporosis through health educational campaign which directed to high-risk groups and aimed to relevant health professional as well as other professionals in the community.

Based on Health Belief Model, health belief influence lifestyle; people change their behavior when they understand that the disease is serious, otherwise they might not turn to healthy behaviors. Early detection of osteoporosis can be done by screening among the community population which is an important preventive measure. Globally many countries promote educational program to raise awareness for prevention and early detection of osteoporosis (Sadler & Huff, 2007). The Health Belief Model (HBM) has been used in many studies as the theoretical framework for early detection and prevention of osteoporosis (Chan, Kwong, Zang & Wan, 2007; Gaines, Narrett & Parrish, 2010; Hazavehei, Taghdisi & Saidi, 2007; Huang, Su, Chine & Goo, 2011; Manios, Moschonis, Katsaroli, Grammatikaki & Tanagra, 2007; Nieto, Tejada, Colin & Matos, 2009; Sedlak, Doheny & Jones, 2007).

1.2 Problem statement

Osteoporosis does not only causes increase economic burden, it also leads to social, physical and psychological consequences. A recently published Asian study (Choi et al., 2012) pointed out an alarmingly low rate of diagnosis (26.2 %) and treatment (12.8 %) of osteoporosis. In order to overcome and minimise the socioeconomic burden of osteoporotic fractures, much emphasis has to be placed on boosting the knowledge and health education program. Unfortunately, there is paucity of data in this regard from Asian countries. This prompted us to conduct this current study in Malaysia. Osteoporosis is still low prevalent in Malaysia among Asian countries (Tung & Lee, 2006); therefore, prevention is vitally important.

Women are higher risk of suffering osteoporosis and educational intervention is necessary to minimize the incidence of osteoporosis. Panday, Gona & Humphrey (2014) stated osteoporosis as a "women's health issue". Worldwide approximately 20 million women of 45 years above suffer osteoporosis among which 80% are not aware that they have osteoporosis (Meiyanti, 2010). A conservative estimate suggests that every four women over age of 50 years suffer from osteoporosis. Moreover, each year more women die due to osteoporosis as compare to the combined death rate of both breast and ovarian cancer (National Osteoporosis Foundation, 2002).

The incidence of osteoporosis has been increasing particularly due to increase in life expectancy of general population which generally affects women (75%) to a greater extent than men (25%) (Vytrisalova, et al., 2007). This gender imbalance occurs due to lower peak bone mineral density, menopause and longer life expectancy than men. Karim (1997) has indicated that the percentage of females in the population of Malaysia of 70 years and over was 54.2% in 1990 and has estimated that it will increase to 56.7% by 2020. Therefore, women should give more knowledge and health education as they are higher risk of suffering osteoporosis.

Currently there is no recommended health educational promotional program for osteoporosis neither in the community nor in any work place regardless of socio economic factor like age, gender or any health status. Therefore, our current study is expected to be an evidence of effective channel for health promotion in work place in Malaysia.

The worksite is one of the key channels for the delivery of interventions to reduce chronic diseases among adult populations. It provides easy and regular access to a relatively stable population and it encourages sustained peer support. A study conducted by Moy, Sallam & Wong (2006) to reveal impact of a worksite health promotion programme on serum cholesterol and dietary changes among employees in Malaysia which showed that a statistically significant ($p < 0.004$) reduction in their mean total cholesterol levels, also reported a reduction in the number of cigarettes smoked. A study conducted among population of Penang Island, Malaysia by Hassali, et al., (2012) to explore the perceptions towards health promotion activities which reported that 89.6% who attended health promotion campaigns agreed that attendance was of worth and valuable. The adoption of the new lifestyle behaviours should be supported and sustained through modification of work policies by implementation of health campaign or health promotional activity. With these mentioned evidence, our current study endeavoured a mile stone for work place based educational intervention program to promote osteoporosis among female academician in Universiti Putra Malaysia.

Several investigators have focused on occupation as a possible contributor to osteoporosis, either because workplace exposures may cause disease or because occupation potentially identifies groups of women at high risk for reasons other than actual workplace exposures (Malak & Toama, 2015; Safizadeh, Aminizadeh & Safizadeh, 2015; El-Tawab, Aziz, Hahib & Ashry, 2016; Kalkım & Daghan, 2017). Studies have found increases in osteoporosis risk among women in professional occupations ($p < 0.001$) (Safizadeh, Aminizadeh & Safizadeh, 2015) including nursing ($p = 0.001$) (Park, Lee, & Koo, 2017; Zhang & Chandran, 2011) and teaching ($p = 0.004$) (Malak & Toama, 2015). A study found Jordanian teachers were twice at risk of osteoporosis as other women, an association considerably higher which is significant ($p = 0.004$) because of the magnitude of the suggested increased risk and teachers comprise one of the largest single occupational groups among women in Jordan (Malak & Toama, 2015). Recently in Malaysia, women's participation in academic profession has increased (Department of statistic, Malaysia, 2014). So, this

educated need health educational program to promote preventive measure of osteoporosis to reduce the morbidity and mortality related to osteoporosis.

In addition, several studies have demonstrated that the incidence rate of osteoporosis is associated with an inappropriate and poor level of knowledge and perceptions of preventive health measures (Maria et al., 2015; Johnson et al., 2008; Gerend et al., 2006). Over the years education and communication have been emphasized for health seeking behaviour change. Unless women are made aware of the danger and understand the disease, the incidence of osteoporosis in Malaysia will remain the same or become higher. Poverty may also be a factor for the delay diagnosis as well treatment of osteoporosis or an advanced stage of complication as fragility fracture among Malaysian women. Thus, it may take a decade or two to educate and create awareness that encourages health seeking behaviour.

Despite of availability treatment for osteoporosis, prevention is still preferable to combat this disease. A good knowledge and awareness of a disease are pre-requisites for the success of preventive measures, modifications in life styles and treatment adherence (Wallace, 2002). In order to plan for increase awareness and prevention of osteoporosis, information regarding health beliefs and knowledge of osteoporosis in general population is necessary so that adequate strategies can be formulated accordingly. Previously, various studies evaluated knowledge of osteoporosis in different populations and most of these studies assumed that as knowledge regarding a disease increases, attitudes and practices of preventive measures towards that disease change positively (Patil et. al., 2010; Ali et. al., 2011; Nquyen et. al., 2011).

A systematic review was conducted by Khan, Sarriff & Khan (2014) among different communities, to review correlation of knowledge with demographic factors and practice of preventive behaviour which revealed direct relation of knowledge of osteoporosis with level of education. When a woman become educated on osteoporosis and its related complications, then they are capable to take care of their personal health as well as family members (Piaseu, Belza & Mitchell, 2001; Suzanne, Yu-ming & Jean, 2005). Thus, knowledge, belief and self-efficacy assessment among female academician regarding osteoporosis risk factors, calcium intake and physical activity will help to evaluate the effect of comprehensive osteoporosis educational intervention and its implementation in workplace in future.

The unawareness, under recognition and the consequential undertreatment of osteoporosis in the primary care setting remain a global problem which should be addressed. Our current study provides insight into the importance of proper dissemination and implementation of the health education program in community to assess the osteoporosis knowledge progression. Therefore, this current study will improve the gap of knowledge in osteoporosis among the female academician in Universiti Putra Malaysia.

Lifestyle behaviour, such as adequate exercise, weight control, balanced nutrition, and adequate calcium and vitamin D intake, influences the development of healthy bones (Sadler & Huff, 2007). Health beliefs influence these lifestyle choices (Sadler & Huff, 2007). Evidence showed that awareness, proper treatment and preventive exercise interventions reduce incidence of osteoporosis among elderly Korean women (Lee, Cho, Jin, Kim & Kang, 2016). Hill et al., (2009) noted that health belief initiates health beneficial behaviour. Furthermore, health promotional education and guideline can potentially create sustainable behavioural change at a person-centered level.

Knowledge assessment on osteoporosis risk factors and preventive measures, physical activity and adequate calcium intake among women is a better operational process to develop and implement health behavioural educational program. Public awareness of osteoporosis remains low, especially in developing countries. Health education is effective in improving knowledge and awareness among female which can be one of the best choice for increasing knowledge of osteoporosis and inducing behavioural change in the period of peak bone density. In Malaysia, there is scarcity of local studies on the level of awareness toward osteoporosis in both female and male members, therefore the present study aimed to assess osteoporosis knowledge, self-efficacy and belief among female academician in Universiti Putra Malaysia.

1.3 Significance of the study

Work-related illness is a major contributor to injuries and disease worldwide and covering all communicable and non-communicable disease. Although osteoporosis mostly affects people in later life, by which time they've retired or are considering retirement, there are a significant number of people of working age with the condition specially those who are involved in sedentary work. Sedentary employee's present unique opportunities in work place to prevent osteoporosis as occupational setting predominantly is not favorable to maintain healthy bone mass (Weiss, Yogev & Dolev, 1998). Women employees who are involved with sedentary work for long term especially is very prone to develop low peak bone mass which is independent risk factor for osteoporosis. Low bone mass lessens the strength of bone and skeletal frame which also leads to develop fragile fracture.

The high rate of global morbidity and mortality increase due to non-communicable preventable disease like osteoporosis. Lower levels of occupational physical activity, as well as other factors associated with modern life have increased habitual sedentary behavior. The working population spend nearly a half of their waking hours in the workplace making occupational settings an ideal environment to study sedentary behaviors. Sedentary professions involve modest degrees of movement during the performance of normal duties. Most teaching positions revolve around a rigid schedule that limits mobility to a small area

Work place-based health educational intervention improve intake of calcium and even load bearing moderate to vigorous physical activity. A study conducted by Tan, LaMontagne, English & Howard, (2016) which stated that workplace intervention is effective even after 6 months of intervention. But unfortunately, there is no available data in Malaysia where the workplace explored as a platform for osteoporosis prevention interventions. So, this study utilized workplace platform for osteoporosis prevention.

Malaysian women today are employed in the various occupations with teaching being the biggest employer of women besides nursing (Department of Statistics Malaysia, 2016). Therefore, teachers are a large occupational group with the capacity to influence children, parents and the wider community's, medium- and long-term behaviors. However, they are the important resources that contribute to developing the educational quality and the human capital of the nation. Teachers can effectively educate young people about the risk factors, types of osteoporosis and influence behaviors that reduce osteoporosis morbidity and mortality. Several studies have shown inadequate level of knowledge related to risk factors, recommended exercise and nutritional source among female teachers (Malak & Toama, 2015; Safizadeh, Aminizadeh & Safizadeh, 2015; El-Tawab, Aziz, Hahib & Ashry, 2016; Kalkım & Daghan, 2017).

Moreover, Malaysia has a vision to achieve the status fully developed country by the year 2020. To achieve vision 2020, access to quality education, human quality development and teacher development among its most important challenges. Therefore, considering all this issue, female academicians were chosen for this study. It implicated that this representative population will contribute a position change to prevent osteoporosis among their family members, peer as well as young adolescent whom they were involved in teaching; therefore, they will contribute in the prevention of osteoporosis at their personal level, professional level as well as family level.

University academicians are involved with adolescence and early youth age group, whereas the primary and secondary school teachers are intricate with preadolescent, puberty and pre-puberty age groups of students. It is proven that the bone health starts early in life; childhood and adolescence is a critical time for bone building. Approximately half of our bone mass is accumulated during adolescence and the process continues until youth (Levine, 2012). While many occupations have been researched, University female academic staff workplace-based activity has not been examined to prevent osteoporosis.

Therefore, this current study educational intervention program enhances knowledge of university academicians which will help them to take care of their own bone health as well they can contribute their knowledge for the prevention of osteoporosis among the students and also family, friends and peers. University female academicians can contribute by mentoring in psychological and physical counselling of this adolescent

and early youth group to improve bone health which is crucial to prevent osteoporosis in their adulthood.

The annual direct cost of osteoporotic fracture of people in the workplace of United States, Canada and European Union was approximately was \$48 billion (RM 267 billion) (International Osteoporosis Foundation, 2002). An individual with osteoporosis, the direct cost of treatment of osteoporosis and its related other cost like sick leave, loss of job days, unemployment, disability and loss of productivity may lead to severe socioeconomic illness with deprived mental health. It was estimated that in Canada total missing day due to osteoporosis was 3,123,298 days (12,013 full-time employment years) for individual aged 50-69 years (Tarride et al., 2012). But unfortunately, no data found in Asian countries; not even in Malaysia. So current educational intervention program expected to reduce osteoporosis related treatment cost, unemployment due to complication of osteoporosis and fragility fracture among female academician in Universiti Putra Malaysia by primary prevention of osteoporosis which has a potential impact in the burden of osteoporosis in a broader approach.

This current study was conducted with the purpose of assessing the effect of osteoporosis health education program based on Health Belief Model on knowledge among female academicians which proved effective intervention program which could be as a basis for health care providers to plan and develop effective osteoporosis prevention education programs based on a sound theoretical background. Thus, this study prove that the health education intervention module will change knowledge, belief and self-efficacy on osteoporosis which will be a great contribution to osteoporosis management.

1.4 Research question

1. What is the level of knowledge, belief and self-efficacy regarding osteoporosis among female academician in Universiti Putra Malaysia?
2. Can an education program based on Health Belief Model improve knowledge, beliefs and self-efficacy regarding osteoporosis among the female academician in Universiti Putra Malaysia?

1.5 Objective

1.5.1 General objective

To develop, implement and evaluate the effectiveness of Health Belief Model based an educational intervention program on osteoporosis based on Health Belief Model among the female academician in Universiti Putra Malaysia.

1.5.2 Specific objectives

1. To determine and compare the socio-demographic factors of osteoporosis among both intervention and control group of the female academician in Universiti Putra Malaysia at baseline.
2. To identify and compare the sources of osteoporosis information among both intervention and control group of the female academician in Universiti Putra Malaysia.
3. To determine and compare osteoporosis knowledge, self-efficacy and beliefs among the female academician in Universiti Putra Malaysia both intervention and control group at baseline before the educational intervention.
4. To develop and implement Health Belief Model based educational intervention module for osteoporosis based on Health Belief Model among the female academician in Universiti Putra Malaysia.
5. To determine and comparison on osteoporosis knowledge, self-efficacy and beliefs among the female academician in Universiti Putra Malaysia within intervention and control group immediately, one month and three months follow up after the educational intervention.
6. To determine and compare the osteoporosis knowledge, self-efficacy and beliefs among the female academician in Universiti Putra Malaysia between intervention and control group immediately, one month and three months follow up after the educational intervention.

1.6 Research hypotheses

1. There is a significant difference between the intervention and control groups for osteoporosis knowledge, beliefs and self-efficacy at baseline, immediately, one month and three months post intervention.
2. There is a significant difference within the intervention and control groups for osteoporosis knowledge, beliefs and self-efficacy at baseline, immediately, one month and three months post intervention.

1.7 Definition of terms

Osteoporosis: It is a skeleton disease where bone become fragile and brittle due to lack of bone mass gradually and painlessly (Germano & Cabot, 2000).

Osteoporosis risk factors: This refers the factors that increase possibility to develop osteoporosis; alcohol consumption, smoking, lack of exercise, low intake of calcium is modifiable risk factor whereas gender, race and genetic predisposition are non-modifiable factor (International Osteoporosis Foundation, 2012).

Health Behavior: it is an action of individual, groups or organizations to their determinants, correlates and consequences including social behavior, improve adaptation to enhance quality of life (Glanz, Rimer, & Lewis, 2008).

Health Belief Model: It is theoretical framework which elucidates health behavioral changes guideline to formulate and implement health behavioral interventions (Rosenstock, Strecher & Becker, 1988).

Perceived susceptibility: Refers to the perceived risks of developing osteoporosis (Rosenstock, Strecher & Becker, 1988).

Perceived seriousness: It is concerned with perceived degree of personal threat related to developing osteoporosis (Rosenstock, Strecher & Becker, 1988).

Perceived benefits: Refer to perceptions regarding the effectiveness of taking in adequate calcium and performing appropriate exercise to prevent osteoporosis (Rosenstock, Strecher & Becker, 1988).

Perceived barriers: These are perceptions of negative components of taking in adequate calcium and performing exercise in regard to osteoporosis preventive behavior (Strecher & Rosenstock, 1997).

Health motivation: Relates to a state of concern about health matters that may influence an individual's general health behavior (Strecher & Rosenstock, 1997).

Cues to action: refers to individual readiness to act or implementation of an intervention (Strecher & Rosenstock, 1997).

Self-efficacy: It is defined as a perception concerning the ability to take in adequate amounts of calcium and the ability to perform exercise to prevent osteoporosis (Strecher & Rosenstock, 1997).

Knowledge: It is defined as information that an individual has about risk of developing osteoporosis and preventive behaviors concerning calcium intake and exercise (Insel & Roth, 2010).

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