UNIVERSITI PUTRA MALAYSIA

INTERVENTION EFFECTIVENESS TOWARDS IMPROVEMENT ON KNOWLEDGE, HEALTH BELIEFS AND ANTICIPATED HELP-SEEKING FOR OVARIAN CANCER AMONG UNIVERSITY NON-ACADEMIC STAFF IN MALAYSIA

NAJAT MILAD ALMAHDI

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By

NAJAT MILAD ALMAHDI

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

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DEDICATION

To my lovely parents, husband, children and my sisters and brothers for their understanding, encouragement and patience, without whose support and care I wouldn't have realize my dreams in life.

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

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Chairman: Rosliza Abdul Manaf , MBBS, MComMed, PhD
Faculty: Medicine and Health Sciences

Ovarian cancer (OC) is one of the deadliest gynecological cancer because of late detection of it. Early detection could be promoted by increasing knowledge, and minimizing barriers and improving time of seeking medical help for ovarian cancer symptoms. Previous studies showed low ovarian cancer awareness among working Malaysian women. The main objective of this study was to develop, implement and evaluate the effectiveness of an educational intervention to improve ovarian cancer knowledge, health beliefs, perceived barriers, and anticipated help-seeking among female non-academic staff in Universiti Putra Malaysia (UPM). This is a randomized controlled trial (RCT), considered in three phases. Phase I was a cross sectional study aimed to obtain current data on the knowledge and attitude related to OC among female non-academic staff in UPM. Data was collected from 366 participants. Response rate of 91.5%. About 96.4% of them were Malay, with mean age of 34 years (SD 7.8). A low knowledge was reported by 46.5% of participant which was predicted by age (P=0.01) and having heard or read about OC (P < 0.001). Half of participants showed negative attitude related to OC, which were predicted by marital status (P<0.001), education level (P=0.02), and having heard or read about OC (P=0.02). In Phase II, educational module was developed according to the Health Belief Model (HBM) and validated. The module composed of educational videos, leaflet, and ovarian cancer symptoms checklist diary. In Phase III (RCT), multi-stage random sampling was used to select 305 of female non-academic staff who were randomly allocated into study groups (157 in the intervention group vs. 148 in the control group at baseline). The response rate were 73.6%. Data was collected at baseline, immediately, and 3 months after intervention using a validated online questionnaire that adapted from Ovarian Cancer Awareness Measures (Ovarian CAM). There was no significant differences in sociodemographic characteristics between intervention and control group. The mean age of participants was 37.8 years (SD 8.1), and the majority were Malay (96.7%). In the intervention group, the mean scores of anticipated help-seeking, knowledge, and confidence in symptom detection had increased significantly from baseline to immediately, and 3 months after intervention

[5.9 (SD 2.6), 6.7 (SD 2.9), 8.8 (SD 1.4), p< 0.001], [5.2 (SD 3.3), 12.3 (SD 2.7), 11.17 (SD 2.5), p<0.001], and [2.19 (SD 1.0), 2.5 (SD 0.91), 2.6 (SD 1.0), p=0.001] respectively. Similarly, the mean scores of the three types of perceived barriers had increased significantly after the intervention at baseline, immediately and 3 months which include: emotional barrier [3.14 (SD 0.9), 1.19 (SD 0.9),1.69 (SD 0.9), p<0.001], practical barrier [1.93 (SD 0.9), 1.79 (SD 0.9), 0.73 (SD 0.8), p<0.001], and service barrier [1.73 (SD 0.8), 1.64 (SD 0.8), 1.62 (SD 0.8), p<0.001]. The mean score of the perceived benefits shows a significant increase after the intervention at baseline, immediately and 3 months [10.9 (SD 2.5), 11.3 (SD 2.5), 11.5 (SD 2.7), p<0.001]. However, the perceived susceptibility mean score showed non-significant increase at the three points of assessments of study [11.8 (SD 2.8) 12.5 (SD 3.6), 12.7 (SD 3.7), p=0.08]. The control group showed no significant changes in all measured aspects. These results provide evidence for the effectiveness of the electronic-based educational intervention in increasing ovarian cancer knowledge, and anticipated help-seeking for ovarian cancer symptoms among Malaysian non-academic staff at UPM. This study suggests that knowledge on ovarian cancer can improve anticipated seeking help behavior for short term duration. In addition, long term effects need to be addressed for promoting ovarian cancer early detection among Malaysian women.

Keywords: ovarian cancer, knowledge, anticipated help-seeking, Malaysia, non-academic

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

KEBERKESANAN INTERVENSI TERHADAP PENINGKATAN PENGETAHUAN, KEPERCAYAAN KESIHATAN DAN JANGKAAN MENDAPATKAN BANTUAN BAGI KANSER OVARI DALAM KALANGAN STAF BUKAN AKADEMIK DI MALAYSIA

Oleh

NAJAT MILAD ALMAHDI

Februari 2018

Pengerusi: Rosliza Abdul Manaf, MBBS, MComMed, PhD
Fakulti: Perubatan dan Sains Kesihatan

Kanser ovari (OC) adalah salah satu daripada kanser ginekologi yang boleh membawa maut kerana ia lambat dikesan. Pengesanan awal amat digalakkan untuk meningkatkan pengetahuan, mengurangkan halangan dan mempercepatkan wanita mendapatkan bantuan perubatan jika berlaku gejala kanser ovari. Kajian terdahulu menunjukkan kesedaran kanser ovari yang rendah dalam kalangan wanita Malaysia yang bekerja. Objektif utama kajian ini adalah untuk membangunkan, melaksanakan dan menilai kesan intervensi pendidikan kanser ovari untuk meningkatkan pengetahuan tentang kanser ovari, kepercayaan kesihatan, halangan dan jangkaan mendapatkan bantuan bagi simptom kanser ovari dalam kalangan kakitangan wanita di Universiti Putra Malaysia (UPM). Kajian ini adalah percubaan rawak terkawal (RCT) yang mempertimbangkan dalam tiga Fasa. Fasa I adalah kajian keratan rentas yang bertujuan untuk mendapatkan data terkini tentang pengetahuan dan sikap kanser ovari dalam kalangan kakitangan wanita di UPM. Data ini dikumpul daripada 366 peserta. Kadar maklum balas sebanyak 91.5%. Kira-kira 96.4% peserta adalah Melayu, dengan umur 34 tahun (SD 7.8). Pengetahuan adalah dilaporkan rendah sebanyak 46.5% peserta yang diramalkan oleh umur ($P = 0.01$) dan setelah mendengar atau membaca mengenai OC ($P < 0.001$). Tahap II adalah pembangunan modul pendidikan yang disesuaikan dan disahkan oleh Model Kepercayaan Kesihatan. Modul ini terdiri dari tiga elemen iaitu video pendidikan, risalah, dan diari senarai semak gejala kanser ovari. Dalam Fasa III (RCT), persampelan rawak pelbagai peringkat telah digunakan untuk memilih 305 kakitangan wanita bukan akademik dan kaedah rawak diperuntukan dalam 2 kumpulan (157 dalam kumpulan intervensi berbanding 148 dalam kumpulan kawalan pada peringkat penilian asas). Kadar maklumbalas sebanyak 73.6%. Dalam kajian ini data dikumpulkan daripada para peserta pada peringkat penilaian asas dan 3 bulan selepas intervensi dengan menggunakan borang soal selidik kepercayaan dan pengesahan yang disesuaikan dari adaptasi daripada Pengukuran Langkah-langkah Kesedaran Kanser Ovarian (Ovarian CAM). Tiada perbezaan yang signifikan dalam kesemua kriteria sosiodemografi peserta kumpulan intervensi dan kawalan. Dalam kumpulan intervensi, skor min untuk jangkaan

mendapatkan bantuan, pengetahuan dan keyakinan terhadap pengesanan gejala telah meningkat secara signifikan selepas intervensi pada peringkat penilian asas, kemudiaan dan 3 bulan [5.9 (SD 2.6), 6.7 (SD 2.9), 8.8 (SD 1.4), p< 0.001], [5.2 (SD 3.3), 12.3 (SD 2.7), 11.17 (SD 2.5), p<0.001], dan [2.19 (SD 1.0), 2.5 (SD 0.91),2.6 (SD 1.0), p=0.001] masing-masing. Begitu juga skor min ketiga-tiga halangan yang dirasakan telah meningkat dengan ketara selepas intervensi pada peringkat penilian asas, kemudiaan dan 3 bulan termasuk: halangan emosi [3.14 (SD 0.9), 1.19 (SD 0.9),1.69 (SD 0.9), p <0.001], halangan praktikal [1.93 (SD 0.9), 1.79 (SD 0.9),0.73 (SD 0.8), p <0.001] dan halangan perkhidmatan [1.73 (SD 0.8), 1.64 (SD 0.8)), p <0.001]. Min skor faedah yang dirasakan menunjukkan peningkatan yang signifikan selepas intervensi pada peringkat penilaian, kemudiaan dan 3 bulan [10.9 (SD 2.5), 11.3 (SD 2.5), 11.5 (SD 2.7), p <0.001]. Walau bagaimanapun, skor min bagi kecenderungan tidak menunjukkan hubungan signifikan pada tiga peringkat penilian kajian [11.8 (SD 2.8) 12.5 (SD 3.6), 12.7 (SD 3.7), p = 0.08]. Kumpulan kawalan tidak menunjukkan sebarang perubahan ketara dalam semua aspek yang diukur. Keputusan ini memberikan bukti bahawa keberkesanan intervensi pendidikan yang berasaskan elektronik mampu meningkatkan pengetahuan kanser ovari dapat meningkatkan tingdan niat untuk membantu mencari bantuan segera untuk gejala kanser ovari dalam kalangan wanita bekerja di Malaysia. Kajian ini mencadangkan bahawa kanser ovari dapat meningkatkan tingkahlaku penjagaan pencegahan dalam tempoh jangka masa yang pendek. Oleh itu, kesan jangkan panjang bagi mempromosikan pengesanan awal kanser ovary dalam kalangan wanita harus dipertekankan.

Kata kunci: kanser ovari, pengetahuan, jangkaan mendapatkan bantuan, Malaysia, bukan akademik

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I certify that a Thesis Examination Committee has met on 22 February 2018 to conduct the final examination of Najat Milad Almahdi on her thesis entitled "Intervention Effectiveness Towards Improvement on Knowledge, Health Beliefs and Anticipated Help-Seeking for Ovarian Cancer among University Non-Academic Staff 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.

Members of the Thesis Examination Committee were as follows:

Titi Rahmawati binti Hamedon, PhD
Senior Lecturer
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Chairman)

Zailina binti Hashim, PhD
Professor
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Internal Examiner)

Hejar binti Abd. Rahman, PhD
Associate Professor
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Internal Examiner)

Rizanda Machmud, PhD
Professor
Andalas University
Indonesia
(External Examiner)

NOR AINI AB. SHUKOR, PhD
Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 28 June 2018

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

Rosliza Abdul Manaf, MBBS, MComMed, PhD
Medical Lecturer
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Chairman)

Suriani Ismail, MD, MPH, PhD
Medical Lecturer
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Member)

Hayati Kadir, MBBchBAO, M.Community Health
Medical Lecturer
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Member)

_____
ROBIAH BINTI YUNUS, PhD
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School of Graduate Studies
Universiti Putra Malaysia

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Signature: _____
Name of Member of Supervisory Committee: _____

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

OR	Odds Ratio
aOR	Adjusted Odds Ratio
PPV	Positive Predictive Value
HRT	Hormonal Replacement Therapy
CCP	Contraceptive Pills
SES	Socio-Economic Status
RR	Rate Ratio
HR	Hazard Risk
SI	Symptoms Index
MET	Metabolic Equivalent Tasks
BMI	Body Mass Index
UPM	University Putra Malaysia
CA 125	Cancer Antigen 125
CAM	Cancer Awareness Measure
ABC	Awareness and Beliefs about Cancer Measure
ABC-O	Awareness and Belief about Cancer-Ovarian Measure
Ovarian CAM	Ovarian-Cancer Awareness Measure
HBM	Health Belief Model
BRCA	Breast cancer suppressive gene
GLM	General Linear Model
ANOVA	Analysis of Variance

CHAPTER 1

INTRODUCTION

1.1 Background

Ovarian cancer (OC) ranks among the top ten diagnosed cancer in most countries (Ferlay, Héry, Autier & Sankaranarayanan, 2010). It is the seventh most common cancer world wide (Stewart, 2012). According to Ferlay et al. (2010), a total of 224,747 new cases of ovarian cancer were reported worldwide in 2008, 99,521 cases of them diagnosed in more developed countries, and 125,226 in less developed countries. Ovarian cancer is the second common gynecological cancer followed by uterine and cervical cancer in developing countries (Iyoke & Ugwu, 2013).

Malaysian statistics show that cancer of the ovary was the fourth most common cancer among women in Peninsular Malaysia (National Cancer Registry, Malaysia, 2011). It composed of 6.1% of total female cancer and the crude incidence rate of 5.9 per 100,000 populations (National Cancer Registry, Malaysia, 2011), and crude death rate of 4.5 per 100,000 (Razi et al., 2016). The incidence rate of ovarian cancer in Malaysia represent the seventh highest incidence among Asian countries while the crude mortality rate is the eighth highest among them (Razi et al., 2016).

Despite advances in chemotherapy and surgery, ovarian cancer is a particularly deadly gynecological malignancy worldwide (Lutz et al., 2011). It ranks among the top five most fatal malignancies in most countries (Ferlay et al., 2010). Ovarian cancer has a high proportion of deaths compared to the number of diagnosed cases. On a worldwide basis, 225,000 cases of ovarian cancer were diagnosed in 2005, with 140,100 deaths (Ferlay et al., 2010; Sankarayanan & Ferlay, 2006).

Ovarian cancer is an insidious disease, and prognoses of cases are closely related to the tumor stage at the time of diagnosis. It has highly curable rate when it is diagnosed at early stages (stage I, and II) (Jayson, Kohn, Kitchener & Ledermann, 2014). The 5-years survival rate of diagnosed cases at stage I and stage II is as high as 80.6 %. However, it is only 11.2-33.3 % 5-year survival rate when the disease has spread outside the pelvis (stage III – IV) (George et al., 2013). However, most of the ovarian cancer cases (70% to 75%) have been diagnosed at stages III-IV world wide (Jayson et al., 2014). Hence, many screening strategies have been developed to detect ovarian cancer early to improve the 5-years mortality rate.

Considerable attention has been made to explore the efficacy of current ovarian cancer screening methods in the reduction of mortality. However, this efficacy has not been established yet (Menon, Griffin, & Gentry-Maharaj, 2014). Current ovarian cancer screening that is based on transvaginal ultrasound exam or CA-125 blood test do not have enough level of sensitivity and specificity (Drescher et al., 2012; Van Der Velde et

al., 2009; Kobayashi et al., 2008). Indeed, they do not reduce the mortality rate of ovarian cancer as shown in a quite recent result of the biggest trial (United Kingdom Collaborative Trial of Ovarian Cancer Screening) (UKCTOCS) that address effect of different screening strategies on ovarian cancer mortality rate (Jacobs et al., 2016).

For several years significant efforts have been devoted to the study of ovarian cancer early symptoms. These studies refute the old misconception that early stages of ovarian cancer have no warning signs and symptoms (Hamilton et al., 2009; Goff, Mandel, Melancon & Muntz, 2004). Most of the early ovarian cancer symptoms mimic the symptoms of common disorders or benign conditions such as irritable bowel syndrome, gastritis, dietary problems, urinary tract infection, stress or even depression (Cooper, Polonec, Stewart & Gelb, 2012). Indeed, these signs and symptoms include mainly, bloating, increase the size of the abdomen, pelvic or abdominal pain, early satiety, change in bowel habits, and frequent urination (Hamilton, Peters, Bankhead, & Sharp, 2009; Bankhead et al., 2008; Goff et al., 2004). Progression of medical research in this field was large enough to develop the Ovarian Cancer Symptoms Index (Goff et al., 2007). The sensitivity of this cost-free screening method is 56.7% for early stages and 79.5% for late stages. The specificity ranged from 86% to 90% (Goff et al., 2007). Given that single effective ovarian cancer screening in the general population is not available yet and development of symptoms index, early detection of ovarian cancer reliant upon women recognition of the symptoms and seek medical help has been gaining importance in recent years.

Even though the majority of women with ovarian cancer experienced symptoms at early stages, they did not seek medical help after the onset (Forbes, Warburton, Richards & Ramirez, 2014; Simon et al., 2010; Macleod, Mitchell, Burgess, Macdonald & Ramirez, 2009). The most important factor associated with the extended period of symptomatic presentation is those that related to women's health care-seeking behaviors (Yawn et al., 2004), i.e., delay presentation to medical care or lack of completion to recommended test. Patient - related delay among women with ovarian cancer is well documented by several publications that used a broad range of research methods (Cooper, Gelb, Trivers & Stewart, 2016; Brain et al., 2014; Low et al., 2013; Morris, Sands & Smith, 2010; Evan et al., 2007).

Many studies found that positive early detection behaviors such as help-seeking behavior or intending help-seeking behavior can lead to early diagnoses if the person has enough awareness about warning signs of disease and overcome the practical and perceived barriers (Rahaei, Ghofranipour, Morowatisharifabad & Mohammadi, 2015; de Nooijer, Lechner & de Vries, 2002). Unfortunately, the majority of women have a low level of awareness related to early signs and symptoms of ovarian cancer, and these are the reasons behind their delay to seek medical help (Ferrell, Smith, Cullinane & Melancon, 2003; Goff Goff, Mandel, Muntz & Melancon, 2000). Intention to seeking help for most ovarian cancer symptoms was low (Cooper et al., 2016; Brain et al., 2014), because they did not recognize symptoms as particularly serious (Evan et al., 2007) which may negatively affect the time needed to diagnosed cases of ovarian cancer.

Previous studies conducted in Malaysia shows a low level of ovarian cancer knowledge among Malaysian women (AL-Naggar, Osman, Bobrysher, & Abdul Kadir , 2013) and risk factors (Keng, Bainun, Wahab, Chiu & Yusuf, 2015), and negative belief and perceived barriers to seek cancer screening services (Farooqui et al., 2013; Wong, Wong , Low, Khoo & Shuib, 2009) that affects help-seeking behavior among Malaysian women.

It is clear that educating women to increase their level of knowledge about possible early symptoms of ovarian cancer might have a positive impact on the early detection of ovarian cancer and thus enhance survival. Efforts of ovarian cancer health education programs and campaigns are needed to highlight the nature of ovarian cancer symptoms; benefits of early detection of this disease and it should focus on the usage of symptoms based ovarian cancer screening tool. The awareness is definitely will increase the proportion of women who present early to the clinic.

1.2 Problem Statement

The poor survival rate of ovarian cancer cases is currently a problem internationally. In Malaysia, medical statistics showed highest death-to-incidence ratio. Ovarian cancer in Malaysia kills about 4.5 per 100,000 women (Razi et al., 2012) while it is affecting 5.9 per 100.000 women /year (National Cancer Registry, Malaysia, 2011). It has earned itself the title as the deadliest of all gynecological cancer, and that results from it being often diagnosed at late stages of disease (Ferlay et al., 2010).

Early diagnosis of ovarian cancer is important because of the established association between stage when ovarian cancer is diagnosed and the 5- years' survival rate (Green, 2016; Su, Graybill, & Zhu, 2013). Ovarian cancer diagnosed at earlier stages (stage I, II) have higher 5-year survival rate than cases diagnosed in late stages (III, IV). However, the majority of women with ovarian cancer are diagnosed at advanced stages (III, and IV) (Su et al., 2013). In Malaysia, more than half of cases diagnosed at late stages (III, IV) (National Cancer Registry, Malaysia, 2011). Therefore, early detection is critical and should be well addressed to improve ovarian cancer outcomes.

Early diagnosis of ovarian cancer is the biggest challenge, and its prognosis has remained poor without any change in the overall mortality rate. That is a result of many causes. First, failure of medical science to find practical screening tool that can detect ovarian cancer among women in the general population. Second, the vagueness of symptoms (Jayde, White & Blomfield, 2010) which are unrecognizable by the majority of women resulting them to seek medical help at late stages. Therefore, it is typically presented at advanced stages when prognosis is poor.

Unfortunately, studies about ovarian cancer awareness that target different populations of women repeatedly have displayed a non-profound knowledge regarding symptoms and risk factors of ovarian cancer (Brain et al., 2014; Fallowfield et al., 2010; Jones et al., 2010; Lockwood-Rayerman et al., 2009). There is a poor public knowledge compared

to breast cancer (Carter, DiFeo, Bogie, Zhang & Sun, 2014). In Malaysia, there is a critical ovarian cancer knowledge gap among women in the general population (AL-Naggar et al., 2013). Therefore, enhancing public awareness of the potential early symptoms must be the priority toward expediting diagnosis, which can be accomplished by Improve symptoms recognition and enhance early detection of ovarian cancer via selectively examining women who present with particular symptoms' cluster suggestive ovarian cancer (Hamilton et al., 2009; Bankhead et al., 2008; Goff et al., 2004).

Early detection of ovarian cancer can begin with women reports symptoms to health care provider. Prolong of time that women need it to report these symptoms, can be affected by many factors. For example, lack of cancer symptoms knowledge, young women, unretired women, ethnic differences, education level, unconfidence in symptoms detection, and perceived barriers (Cooper et al., 2016; Brain et al., 2014; Low et al., 2013). On the whole, as soon as women recognized and report her symptoms to health care provider, the time need for diagnoses will be shorter. That is to say, the timing of help-seeking for potential cancer symptoms is a potentially modifiable approach to improving early diagnosis.

Consequently, identification of knowledge's gaps related to ovarian cancer and apply an evidence-based intervention to minimize it and promote help-seeking will enhance the early symptomatic presentation of patients and improve survival. Women should be informed about the cluster of symptoms and signs that could indicate the presence of ovarian cancer, and enable them to be their health care advocates (Jayade et al., 2010).

It is apparent from the above that demonstrate a need for more compelling educations efforts to raise awareness related to ovarian cancer symptoms and refute misconceptions surroundings this disease. Equally important, educational intervention is required to overcome the barriers to a timely appropriated symptomatic presentation, and improve women confidence in their ability to recognize and act upon these symptoms. To our knowledge, this intervention study is unique in attempting to increase ovarian cancer awareness and promote the timely help-seeking for ovarian cancer symptoms among Malaysian population.

1.3 Significance of the Study

Measuring of the actual time needed to seek care for the real ovarian cancer symptoms is difficult, either retrospective or prospective. However, analysis of meta-analysis indicated that intention behavior explained 28% of the variances in future behavior (Sheeran, 2002). Thus, the time for seeking medical help for possible symptoms was measured which might reflect the actual behavior. This study is among the few studies that attempted to test the effectiveness of an educational intervention on timely seeking help for hypothetical ovarian cancer symptoms.

The result of this study is useful in the Malaysian's public health field as the population under study is Malaysian female working women. This study explored knowledge of

Malaysian women on ovarian cancer and their anticipated time to seek help for symptoms associated with ovarian cancer as well as their perceived barriers to request help for these symptoms. In fact, the implemented intervention was an attempt to overcome the barriers of the timely symptomatic presentation via improving participants' understanding of early symptoms and signs associated with ovarian cancer, the evaluating of early presentation of cases, and enhancing women's confidence and personal abilities to recognize and act upon ovarian symptoms.

Finding of this study will play a significant role in empower university-community engagement-transfer evidence-based knowledge on ovarian cancer symptoms, screening methods and intention-behavior related to seek medical help for its symptoms. Besides, study finding is useful to help the policy maker to understand more about the real and current situation of the target population, and use a relevant primary data which are necessary for any well-planned health program and efficient strategies that aimed to improve ovarian cancer long term survival.

Identifying and documenting the levels of ovarian cancer awareness, anticipated time to seek medical help and perceived barriers to see a doctor among Malaysian population provide an opportunity for national and international comparative purposes. Moreover, it offered a chance to test the Health Belief Model (HBM) theory in term of modifying health care seeking behavior among Malaysian working women. The result of this study can provide a substantial empirical support of the model and can add more evidence on the model's performance.

1.4 Research Questions

1.4.1 Research Questions of Phase I (Cross sectional study)

i. What is the level of ovarian cancer knowledge among female non-academic staff on ovarian cancer symptoms, risk factors, and early detection and screening?
ii. What is the attitude held by female non-academic staff towards ovarian cancer screening and early detection?
iii. What are the best predictors for knowledge and attitude related to ovarian cancer among female non-academic staff in UPM?
iv. What is the source of information related to ovarian cancer among female non-academic staff in UPM?

1.4.2 Research Question of Phase III

What is the effect of the intervention on the anticipated help-seeking, knowledge, health beliefs related to ovarian cancer among female non-academic staff in UPM at baseline assessment?

1.5 Research Objectives

1.5.1 General Objectives

To develop, implement, and evaluate the effectiveness of electronic-based health education intervention on the anticipated help-seeking, knowledge, and health beliefs related to ovarian cancer among female non-academic staff in UPM.

1.5.2 Specific Objectives:

i. To determine the level of ovarian cancer knowledge among female non-academic staff in UPM.
ii. To determine the level of attitude related to ovarian cancer early detection and screening among female non-academic staff in UPM.
iii. To identify sources of ovarian cancer information among participants.
iv. To determine the association between the sociodemographic factors, personal family medical background with the ovarian cancer knowledge and attitude among female non-academic staff of UPM.
v. To determine the best predictors of a low level of knowledge and attitude towards OC.
vi. To develop ovarian cancer health education module that can improve anticipated help-seeking, knowledge, and beliefs related to ovarian cancer among female non-academic staff in UPM.
vii. To determine the levels of anticipated help-seeking, knowledge, health beliefs, related to ovarian cancer among female non-academic staff at baseline in both groups at baseline.
viii. To compare the mean scores of anticipated help-seeking, knowledge, health beliefs related to ovarian cancer between control and intervention groups at immediately, and 3-months after intervention.
ix. To compare the mean scores of anticipated help-seeking, knowledge, health beliefs related to ovarian cancer between baseline and post intervention assessment within each group.

1.6 Research Hypotheses

I. Sociodemographic factors, personal and family medical background have a significant associations with the ovarian cancer knowledge and attitude among female non-academic staff in UPM.
II. There are significant differences between control and intervention groups for anticipated help-seeking, knowledge, health beliefs related to ovarian cancer at immediately, and 3-months after intervention.
III. There are significant different between baseline and post intervention assessment of the mean score for anticipated help-seeking, knowledge, health beliefs related to ovarian cancer among intervention group.

1.7 Operational Definitions of Study Variables

1.7.1 Dependent Variable

I. Primary Dependent Variable

Anticipated help-seeking for symptoms associated with ovarian cancer.

It is a variable which describe immediate medical help seeking for ovarian cancer symptoms in a hypothesized way. It is the primary outcome and measured by one item questions: How soon would you contact your doctor to make an appointment to discuss this symptom? Intended time for each symptom was assessed separately. Ten options were provided to answer this question: (1-3 days, 4-6 days, one week, two weeks, one month, six weeks, three months, six months, 12 months, never). Then the options was dichotomized into help-seeking by the median-chosen cutoff point or earlier (prompt help-seeking), and help-seeking longer than the median score (delay seeking help). Summation help-seeking $\leq$ median across all the ten symptoms would generate the promptness of help-seeking score which ranges from 0 to 10, with higher score indicate prompted help-seeking for most of the symptoms.

II. Secondary Dependent Variable

Knowledge of Ovarian Cancer

In this study, knowledge of ovarian cancer was defined as the ability of participants to recognize possible ovarian cancer warning signs and symptoms as well as its predisposing factors. It was assessed by measuring the proportion of right knowledge that participant has. Knowledge of ovarian cancer in this study was the secondary dependent variable and affect the anticipated help-seeking for ovarian cancer symptoms.

Health Beliefs Retread to Ovarian Cancer

Ovarian cancer health-related beliefs are used to describe and monitor participant's beliefs and attitude toward four constructs. Health beliefs in this study were a secondary outcome that may affect participant' decision and ability to seek medical care for their symptoms. Health beliefs related to ovarian cancers were composed of four constructs which include:

a. Perceived benefits of early presentation

Definition of perceived benefits of early presentation in this study is the participants' beliefs about the efficacy of the advised action (seeking medical care soon for symptoms associated with ovarian cancer) to reduce the risk of the seriousness of the impact. It was measured by the proportion of participant' agreement with five positive statement related to the benefits of early presentation and diagnosis of ovarian cancer.

b. Perceived susceptibility to ovarian cancer.

In this study, perceived susceptibility to ovarian cancer was defined as participants' beliefs about their possibilities of getting ovarian cancer in future. Perceived susceptibility used 5-point scales (from strongly disagree to strongly agree). It was assessed by proportion of participants who agree or strongly agree with four items described the likelihood of developing ovarian cancer.

c. Perceived confidence in symptoms detection

In this study, perceived confidence in symptom detection was defined as participants' self-efficacy to their abilities to notice symptoms of ovarian cancer. It was assessed by proportion of participants on how confident or very confidence to detect ovarian cancer symptoms as they responded to one item question (How confident or not, are you that you would notice a symptom of ovarian cancer?).

d. Perceived barriers to presentation

The perceived barrier to the presentation was defined in this study as participants' opinion about tangible, and psychological costs to see a doctor (medical health provider) as a responded to ovarian cancer symptoms. Three barriers included in this study (Emotional barrier; Practical barrier, and Service barrier). Each barrier was assessed by proportion of participant who endorsed this barrier.

1.7.2 Independent Variables

I. Health Education Intervention

Health education intervention variable: It is a health education program designed to provide a health information related to ovarian cancer. Namely: early ovarian symptoms, predisposing factors, survival rate, stages, prognoses, screening methods, current standard of diagnosis and treatment. All this information is provided to participants during intervention phase in a particular package used to close the knowledge gap

between the up to date existing knowledge and that which is known and believes by participants.

Education package is composed of:

1. Six minutes long video with cartoon intimated design with Bahasa Malayu language.
2. Tailored printed material (leaflet + copy of ovarian cancer symptoms checklist diary) have been written in Bahasa Malayu language.

(Video was delivered to participants via electronic based methods, e.g., WhatsApp, and Emails)

II. **Socio-demographic Characteristics Variable**

Socio-demographic variables: it is information about the following characteristics (age, race, religious, marital status, the level of education, and family monthly income.

III. Personal and family medical background variable

Family and personal medical background variables: it is information about the personal history of using contraceptive pills and hormonal replacement therapy and their duration, Past or present history of ovarian or breast cancer among first or second relatives as well as information about the personal history of breast cancer.

1.8 Definition of Terms

Ovarian cancer

It is a type of malignant tumor that begins at ovaries.

Early detection of ovarian cancer

It is the diagnoses of ovarian cancer in stage I or stage II.

5 - Years survival rate

It is the percentage of ovarian cancer patients who live at least five years after cancer diagnosed.

Ovarian cancer symptoms

It is the abnormal sensation or conditions that women with ovarian cancer can notice. Symptoms described in this study are the symptoms reported by (Goff et al., 2007). They include:

a. Persisted abdominal/pelvic pain.
b. Feeling full quickly.
c. Urgency or frequency of urination.
d. Unexplained change in bowel habits.
e. Increased abdominal size.
f. Weight loss/gain.
g. Back pain.
h. Unusual fatigue.

Ovarian cancer' symptoms checklist screening tool

It is a personal instrument in the form of the diary. Composed of a list of symptoms that might be caused by early stages of ovarian cancer, along with duration and frequency.

Anticipated time for help-seeking for ovarian cancer symptoms.

It is the duration of predetermined time from ovarian cancer symptoms onset to the time when women seek medical care for their symptom (s).

Electronic- based intervention

It is the intervention that is delivered to target group mainly through the WhatsApps and E-mail that are easily used by daily personal electronic gadgets such as hand phone or tablets

Female non-academic staff

In this study, the female non-academic staff is the woman whose work is administrative or technical, or professional or management officers (support staff) and met all inclusion and exclusion criteria.

Public university

It's a university that predominantly funded by the Malaysian government and managed as self-managed institutions.

A randomized controlled trial

It's a quantitative study in which participants were allocated by chance either to group where participants received education intervention or to group where no intervention, and they received the education intervention at the end of the study. With, measured and compared the outcomes after the participants in intervention group received the intervention

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