EFFECTIVENESS OF ANTENATAL EXERCISE COUNSELING MODULE ON KNOWLEDGE AND SELF- EFFICACY AMONG NURSES IN KELANTAN

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"So, verily, with every difficulty, there is relief" (Ash-Syar-h 94:5)

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ABBREVIATIONS

ACOG American College of Obstetrics and Gynaecologist

NICE National Institute for Health and Care Excellence

RCOG Royal College of Obstetricians and Gynaecologists

ABSTRAK

KEBERKESANAN PROGRAM KAUNSELING SENAMAN ANTENATAL TERHADAP PENGETAHUAN DAN PENIALAIAN KENDIRI TAHAP KEYAKINAN DI KALANGAN JURURAWAT DI KELANTAN

Latar belakang kajian : American College of Obstetrics and Gynaechologist menyarankan wanita hamil tanpa komplikasi untuk melakukan senaman berintensiti sederhana 150 minit seminggu. Petugas kesihatan perlu memiliki pengetahuan yang cukup serta tahap keyakinan yang tinggi dalam menyampaikan kaunseling senaman ibu hamil.

Objektif:. Untuk menilai keberkesanan modul senaman ibu hamil dalam meningkatkan tahap pengetahuan dan keyakinan diri jururawat di Kelantan berbanding kumpulan kawalan dan intervensi ketika permulaan kajian dan 4 minggu selepasnya.

Kaedah: Kajian intervensi berasaskan komuniti dijalankan melibatkan 132 orang jururawat yang bertugas di Klinik Ibu dan Anak yang tidak menjalankan kaunseling senaman ibu hamil sebelum ini. Kumpulan kawalan dan intervensi seramai 66 orang bagi setiap kumpulan dipilih dari daerah Pasir Mas dan Tumpat. Kumpulan intervensi diberikan modul senaman ibu hamil manakala kumpulan kawalan bebas melakukan pembacaan sendiri. Penilaian tahap pengetahuan dan keyakinan dilakukan pada permulaan kajian dan 4 minggu selepasnya. Analisa data dilakukan dengan menggunakan ‘Repeated measure ANCOVA’.

Keputusan: Pada permulaan kaijan, min markah pengetahuan (p 0.827) dan markah keyakinan (p 0.089) menunjukkan tiada perbezaan yang signifikan di antara kumpulan intervensi dan kawalan. Didapati terdapat perbezaan yang signifikan bagi markah pengetahun antara kumpulan intervensi dan kawalan pada permulaan kajian dan 4 minggu selepasnya setelah tempoh bekerja dan latihan formal dikawal semasa proses analisa (p <0.001). Keputusan yang sama ditunjukkan bagi markah keyakinan di mana terdapat perbezaan yang signifikan bagi markah keyakinan antara kumpulan intervensi dan kawalan pada permulaan kajian dan 4 minggu selepasnya setelah tempoh bekerja dan latihan formal dikawal semasa proses analisa (p 0.005).

Kesimpulan: Modul senaman ibu hamil didapati berkesan dalam meningkatkan tahap pengetahuan dan keyakinan jururawat dalam kaunseling senaman ibu hamil.

ABSTRACT

EFFECTIVENESS OF ANTENATAL EXERCISE COUNSELING MODULE ON KNOWLEDGE AND SELF- EFFICACY AMONG NURSES IN KELANTAN

Background: Recent recommendation by the American College of Obstetrics and Gynaechologist recommends that women with non-complicated pregnancy to engage in 150 minutes per week of moderate-intensity aerobic exercise. The healthcare providers should have adequate knowledge and self-efficacy in the process of counseling.

Objectives: To determine the effectiveness of antenatal exercise counseling module on knowledge and self efficacy between control and intervention groups at baseline and 4 weeks post intervention among staff nurses in Kelantan.

Methods: A community-based interventional study was conducted involving 132 participants were recruited from the Maternal and Child Health Clinic whom did not practise antenatal exercise counseling. The control and intervention groups each consist of 66 nurses randomly selected from Pasir Mas and Tumpat districts, respectively. The intervention group received antenatal exercise counseling module while the control group were free to do self-reading on antenatal exercise. Assessment on knowledge and self-efficacy on antenatal exercise were done at baseline and 4 weeks post intervention. Repeated measure ANCOVA was used to analyse the mean score difference of both groups at baseline and post intervention.

Results: At baseline, there were no significant differences in the mean score of knowledge scores (p 0.827) and self-efficacy scores (p 0.089) between the intervention and control groups. There was significant difference in knowledge scores between intervention and control groups between baseline and 4-weeks post intervention after controlling for duration of practice and formal training received (p <0.001). There was significant difference in self-efficacy scores between intervention and control groups between baseline and 4-weeks post intervention after controlling for duration of practice and formal training received (p 0.005).

Conclusion: The antenatal exercise counseling module found to be effective in improving nurses' knowledge and self-efficacy in antenatal exercise counseling.

CHAPTER 1: INTRODUCTION

Physical exercise is beneficial to general population because it promotes good physical health and prevent obesities, chronic diseases and associated comorbidities. Similar benefits are believed to impose on active mothers who engage in exercise during pregnancy without risk to maternal and fetal health (1). Generally, most pregnant women prefer to be in sedentary state during pregnancy because of the concern on safety of exercise during pregnancy towards themselves and babies. The National Institute for Health and Care Excellence, United Kingdom (NICE) encourage health professionals to give antenatal mother specific and practical advice on recreational exercise and strength conditioning exercise (2).

In general, pregnant women without any medical or obstetric problem should be encouraged to exercise during and after pregnancy. In 2002, the American College of Obstetrics and Gynaechologist (ACOG) has recommended aerobic exercise for all pregnant women wihout medical or obstetrics complications (3). Recent recommendation by the ACOG Commitee Opinion in 2015 recommends that women with non-complicated pregnancy to engage in 150 minutes per week of moderate-intensity aerobic exercise (4). Royal College of Obstetricians and Gynaecologists (RCOG) also recommends pregnant mothers to participate in the recreational exercise that includes energetic (aerobic) exercise (such as, swimming or running) and/or strength conditioning exercise (5).

In Malaysia, Perinatal Care Manual (3rd edition) included the antenatal exercise as one of the components of antenatal care (6). Malaysian Dietary Guideline 2010 recommends pregnant women who are regularly active during pre-pregnancy period to continue their exercise at appropriate level. This local guideline adopted recommendations by ACOG include avoidance of overheating during exercise, warning signs to terminate exercises and contraindication to aerobic exercise (7). In 2014, Family Health Development of Ministry of Health has developed a manual on Antenatal and Postnatal Exercise Program in Health Clinics as a guide for structured program for health care providers and physiotherapists in primary care (8). Despite these recommendations, Malaysian women are believed to avoid exercise during pregnancy and no local data is available to demonstrate exercise habit among Malaysian pregnant women.

The healthcare providers should play their role in advising pregnant women to engage in physical activity. In Malaysia, basic antenatal care is primarily provided by nurses and midwives. Health education regarding pregnancy is one of the important components in antenatal care. However, we believed minimal advice regarding antenatal exercise delivered to the pregnant women by nurses and midwives during their antenatal visit. In fact, some nurses incorrectly advice them to avoid or discontinue exercise during pregnancy. Common reasons reported were unsure about correct information regarding antenatal exercise and lack of self-confidence. To

encourage nurses and midwives to advice on this matter, they should be equipped with adequate knowledge health education material to facilitate them during the counseling.

Aerobic exercise appears to be beneficial to antenatal mothers and carries minimal risk to the foetus. Pregnant women are encouraged to perform moderate intensity exercise at home without any direct supervision by the professional, provided they have received education on the antenatal exercise. As opposed to general population, there are several modifications required for them to exercise safely. To date, there was no module available with emphasis on aerobic exercise among pregnant women. The module available in the country focuses more on muscle strengthening, breathing exercise and proper posture during pregnancy with lack of aerobic exercise. Considering the health benefits of aerobic exercise, it should be incorporated into the daily exercise routine for pregnant mothers. In this study, a new module on aerobic antenatal exercise is developed to facilitate nurses in the counselling process. Thus, the effectiveness of antenatal exercise module in improving the knowledge and self-efficacy among nurses is specifically explored in this study.

CHAPTER 2: LITERATURE REVIEW

2.1 Physical exercise during pregnancy

Physical activity is defined as any bodily movement produced by skeletal muscles that results in energy expenditure (9, 10). Physical activity can be categorized

into occupational, sports, conditioning, household, or other activities. Exercise is a subset of physical activity that is planned, structured, and repetitive and has as a final or an intermediate objective the improvement or maintenance of physical fitness (9). Four main types of physical activities are aerobic, muscle-strengthening, bone-strengthening, and stretching. (11). Pregnant women are encouraged to engage in aerobic and muscle-strengthening exercises before, during and after pregnancy (4).

Aerobic or endurance exercise involves movements of large skeletal muscles such as, arms and legs. This includes swimming, brisk walking, cycling and aerobic dancing. Pregnant women will also benefit from muscle-strengthening exercises such as strengthening of the abdominal muscles, pelvic floor, buttock and thigh muscles, which are effective in preventing and reducing backache during pregnancy (11). Pelvic floor exercise or Keigel exercise is also recommended for pregnant women as it helps to prevent and reduce urinary incontinence symptoms during late pregnancy and postpartum (12). Nevertheless, some modification in routine exercise activity is necessary to accomodate anatomical dan physiological changes in pregnant women.

2.2 Benefits of antenatal exercise

Antenatal exercise has positive effects towards both mother and fetus. Regular physical exercise is beneficial for overweight or obese pregnant mother in order to prevent excessive weight gain. In Malaysia, the prevalence of mother with excessive weight gain during pregnancy in rural district of Kelantan was around 13% (13). Higher prevalence has been demonstrated among urban Malaysia population, which

was 29.4% (14). Considering relatively high prevalence of excessive weight gain among Malaysian pregnant mothers, advising mothers to engage in physical exercise during pregnancy is one of the measures to prevent excessive weight gain.

Randomised control trial in Brazil has showed that antenatal physical exercise contribute to lower gestational weight gain in overweight women (15). Similar results were seen among overweight or obese women engaged in supervised antenatal exercise in a systematic review involving five trials . Lower gestational weight gain was reported in overweight or obese women who engaged in supervised antenatal exercise compared to pregnant women who did not perform antenatal exercise (16).

Regular physical activity during pregnancy not only reduce the risk of excessive antenatal weight gain, but also reduced risk of future overweight and chronic diseases. This includes cardiovascular disease, type 2 diabetes mellitus, osteoporosis, obesity and certain types of cancer (17). Recent research suggests that antenatal exercise improves overall fitness, cardiovascular health and muscle performance, blood pressure and protects against gestational diabetes mellitus. During labor and delivery, it helps to reduce the need for obstetric intervention or caesarean section (18). Physical activity also ease the discomfort caused by the physiological changes of pregnancy, such as, digestive problems, insomnia , anxiety and depression (1)

In terms of musculoskeletal pain during pregnancy, swimming helps to reduce lower back pain, which is a common problem during pregnancy (19). Exercise during pregnancy can strengthen abdominal, back and pelvic muscles which responsible for

posture and weight bearing ability. Once pain develops, low intensity exercise can be a therapy in order to reduce the pain and it has significant positive effect on flexibility of spine (20). One local study among 126 pregnant women found no association between physical activity level and low back pain intensity during pregnancy. Therefore, pregnant women may engage in regular, moderate intensity exercise without concern of developing low back pain after exercise (21).

2.3 Knowledge, attitude and practice towards antenatal exercise

Despite health benefits, pregnant women seem to engage less in physical activity during pregnancy and postpartum (22). Majority of pregnant women do not have good knowledge about doing exercise during pregnancy. One study among Iranian mothers showed that most of them were not aware of the importance and necessity of doing exercise during pregnancy (23). Similarly, inadequate knowledge on exercise and the type of exercises has been documented by a study among 300 women in Zambia. Most practiced general physical activities were of daily living, such as, walking and household chores. Most of them did not aware of any specific or ideal antenatal exercises to meet the current recommendation (24). Similar finding was reported by a study done in India that revealed low level of knowledge on antenatal exercise. Half of them felt that exercise was not necessary with only 18% of the women practicing exercise during pregnancy. Main reasons for not exercising include

feeling tired upon exercising, afraid of exercising and insufficient information on antenatal exercise (25).

Beliefs about exercise and physical activity among pregnant women differ between studies. A study in United States showed that 78% of women agreed that women can continue regular exercise during pregnancy and 89% agreed that regular exercise was better than irregular exercise during pregnancy. Majority of the women agreed with the benefits of exercises including increasing stamina, improving labour and delivery as well as it imposed positive effects on baby's health. The differences in beliefs were due to different educational level, race/ethnicity and participation in regular exercise during pregnancy (26). Chinese and Australian mothers displayed different beliefs, attitudes, barriers and intentions towards exercise during pregnancy (27). In traditional Chinese culture, pregnancy is considered as a vulnerable period that necessitate adequate rest while physical activity is discouraged (28). Another study reported concern about safety that hinder them from exercising regularly at required intensity (29).

2.4 Perception towards healthcare providers advice on exercise

Healthcare providers are responsible to deliver advice on antenatal exercise. An interview with 24 overweight and obese women conducted in Pensylvania reflected women perception towards healthcare provider advice during antenatal visit. Most women perceived that they received limited or no advice on appropriate physical activity during pregnancy. They were advised to be cautious and limit their exercise

during pregnancy. They felt that healthcare providers' knowledge on appropriate exrcise intensity and frequency was limited. This study suggested that healthcare providers' advice during pregnancy is insufficient and often inappropriate, thus, unlikely to influence pregnant women's exercise behaviour (30). Due to limited advice received from healthcare providers, women tend to seek infromation from other sources. In United Kingdom, most of the women obtained information on antenatal exercise from books, magazine, family and friend (31).

2.5 Role of healthcare providers

Healthcare providers, particularly nurses, play important role in promoting antenatal exercise because they have frequent contact with antenatal mothers during routine check ups. In health centers, health promotion is widely accepted as part of the role of nurses and midwives. Counseling as mode of delivering information on antenatal exercise has proven to be safe and applicable (32). A study done on antenatal physical activity counseling among healthcare providers in United State involving 40 certified nurse midwives showed that 65% of respondents provide individualized counseling on antenatal exercise(33).

Regarding information delivery, a study in Pensylvania among 24 pregnant mothers showed that health care providers' advice on exercise and gestational weight gain was insufficient and often inappropriate, thus, unlikely to influence them to engage in physical activity (34). Another study among community nurses and pharmacists reported that they regularly provide guidance on nutrition and physical

activity to women during pregnancy. Thus, continuous education is required to ensure them having the appropriate knowledge (35).

Individual counseling is believed to be a feasible method for health provider to encourage pregnant mother to exercise (32). Although it is perceived as traditional way of educating pregnant mother, it is convenient for the nurses to incoporate in their routine practice. It is also shown to help antenatal mothers to sustain moderate intensity physical activity throughout their pregnancy (32).

2.6 Antenatal exercise in Malaysia

In Malaysian setting, most pregnant women are encouraged to notify to the nearest health clinic so that they will be followed up routinely throughout their pregnancy period. The maternal care service is delivered by Maternal and Child Health Clinic, which is run by medical officers, staff nurses and community nurses. Uncomplicated cases will be reviewed by medical officers at least twice throughout their pregnancy. For the rest of the clinic visits, they are seen by staff nurses and community nurses, unless new problem arises during the follow up. In personalised care, nurses are assigned to look after and follow up the same patient, giving them advantages in rapport and trust. The health education session or counseling is more effective with trust that is built.

2.7 Exercise prescription

Exercise prescription may include activities, such as walking, hiking, jogging/running, aerobic dance, swimming, cycling, rowing, skating, dancing and rope skipping as long as the intensity is within moderate level. The ACOG recommended pregnant women to exercise moderately for 30 minutes on most days of the week in the absence of medical or obstetric complications (3). Moderate intensity physical activity is defined as activity with an energy requirement of 3 to 5 metabolic equivalents. For most healthy adults, this is equivalent to brisk walking at 3 to 4 miles per hour (mph)(36).

Previously, there were specific restrictions for heart rate and exercise duration in the first ACOG guidelines on antenatal exercise published in 1985. Pregnant women were advised to exercise with caution with maternal heart rate not to exceed 140 beats per minute and strenuous activity should not exceed 15 minutes (37). With recent studies, pregnant women are encouraged to follow general adult recommendation of at least 30 minutes of moderate exercise in almost days of the work in the absence of any contraindication (4).

2.7.1 Contraindications and warning signs to aerobic exercise during pregnancy

Before giving exercise prescription, each mother should be screened for contraindications. The overall health, obstetric, benefit and risks should come into consideration before a pregnant woman is prescribed an exercise programme. The ACOG has listed the contraindications to exercise and the warning signs to terminate exercise (Table 2.1) (Obstetricians)

Table 2.1: Absolute and relative contraindications to aerobic exercise during pregnancy

Absolute contraindications to aerobic exercise during pregnancy
• Haemodynamically significant heart disease
• Restrictive lung disease
• Incompetent cervix/cerclage
• Multiple gestation at risk for premature labour
• Persistent second or third trimester bleeding
• Placenta praevia after 26 weeks gestation
• Premature labour during the current pregnancy
• Ruptured membranes
• Pregnancy induced hypertension
• Severe anaemia

Relative contraindications to aerobic exercise during pregnancy

- Anemia
- Unevaluated maternal cardiac arrhythmia
- Chronic bronchitis
- Poorly controlled type I diabetes
- Extreme morbid obesity
- Extreme underweight (body mass index <12 kg/m^2)
- History of extremely sedentary lifestyle
- Intrauterine growth restriction in current pregnancy
- Poorly controlled hypertension
- Orthopaedic limitations
- Poorly controlled seizure disorder
- Poorly controlled thyroid disease
- Heavy smoker

For safety puprose, pregnant mothers must be informed to recognize warning signs to terminate exercise while pregnant. This should be informed to each individual pregnant mother as part of exercise prescription (Table 2.2)(Obstetricians) .

Table 2.2: Warning signs to terminate exercise while pregnant

Warning signs to terminate exercise while pregnant
• Vaginal bleeding • Regular painful contractions • Amniotic fluid leakage • Dyspnoea before exertion • Dizziness • Headache • Chest pain • Muscle weakness affecting balance • Calf pain or swelling

2.7.2 Types of exercise

The type of exercise should be individualized (38). Activities with high risk of abdominal trauma should be avoided during pregnancy. Activities, such as, scuba diving should be avoided throughout pregnancy because of the increased risk for decompression sickness for the fetus. Activities that has increased risk of fall and excessive joint stress, such as, jogging and tennis, should be prescribed precatiously with individual evaluation. In addition to aerobic activities, activities that promote musculoskeletal fitness such as resistance

training (weightlifting) and flexibility exercises can be an option to pregnant women (3).

2.7.3 Initiating exercise during pregnancy

The Canadian guidelines, which were developed by the Society of Obstetricians and Gynaecologists of Canada and the Canadian Society of Exercise Physiology in 2003, encourage regular exercisers to continue being active. For those being sedentary in pre-pregnancy state, they are encouraged to begin exercise in the second trimester (39). In Malaysia, pregnant mothers are encouraged to initiate antenatal exercise after 16 weeks of pregnancy (8). Before initiating antenatal exercise program, they should be screened by nurses and undergo proper evaluation by medical officers for any contraindications. In Canada, a Physical Activity Readiness Medical Examination for Pregnancy was created in 2002 to aid maternity care providers screen the contraindications to exercise and to provide detailed exercise prescriptions for women with uncomplicated pregnancies (40)(39).

2.8 Justification of study

It is the role of the healthcare providers to provide correct advice and information to the pregnant women regarding the antenatal exercise. Having frequent contact with uncomplicated antenatal mothers during routine antenatal follow up, nurses seem to have the greatest opportunities in advising antenatal patients. The

implementation of personalised care where nurses are assigned to look after and follow up the same patient, give them advantage in terms of rapport and trust. The health education session or counseling will be more effective with the trust that is alrealdy built before. With the advise given, nurses will act as mediators, giving options to the patients either to join a structured exercise program by physiotherapy or given individualised exercise prescription by medical officer. Therefore, this study focus on the role of nurses in advising antenatal exercise.

In Malaysia, Prenatal Care Manual (3rd edition) 2013 recognise antenatal exercise as one of the component of antenatal care. Pregnant women without medical problems or complication, is recommended to participate in aerobic exercise and muscle strengthening exercise (6). Despite recommendations by the local guideline, the health care providers apparently do not comply to the guideline in advising antenatal exercise. This is possibly due to lack of knowledge and inadequate training resulting in reluctance in discussing that matter.

Antenatal exercise module might be one of the options in enhancing their knowledge as well as improving their self-efficacy in terms of confidence level in delivering counseling. To date, there is no established module or manual available in guiding the nurses in antenatal exercise counseling in Malaysia specifically on aerobic exercise. Manual on Antenatal and Postnatal Exercise Program in Health Clinics focus more on correct posture in pregnancy, relaxation and joint mobility with lack emphasis on aerobic exercise (8). Thus, this study is designed mainly to determine the

effectiveness of antenatal exercise counseling module in improving knowledge and self-efficacy among nurses in Kelantan, with more focus and emphasis on aerobic exercise.

For healthcare providers, a guide from printed education material may be helpful to help them delivering correct and appropriate health education. In educating pregnant mother to exercise, the counseling session should be concise and effective so that the message is successfully delivered to them. Being among the most convenient, user friendly and cost effective printed material, pamphlet and flip chart is used in this study as the module in guiding medical officer in advising antenatal mother on antenatal exercise. To date, not much data is available on the knowledge and practice on antenatal exercise counseling among health care providers in Malaysia. Data obtained from this study can be the eye opener and may initiate measures to improve antenatal care in Malaysia including proper training and for further research focusing on barriers in promoting antenatal exercise.

2.9 Conceptual framework

Module on antenatal exercise as a guidance is expected to increase knowledge among nurses in counseling pregnant mothers. Subsequently, their self-efficacy in antenatal exercise counseling will increase to convey message effectively. Besides that, there are also other factors affecting the knowledge, and the self efficacy in antenatal exercise counseling which incude the sociodemographic background of the nurses, year of practice, formal training, midviwery course or self reading on Malaysian Perinatal Care Manual.

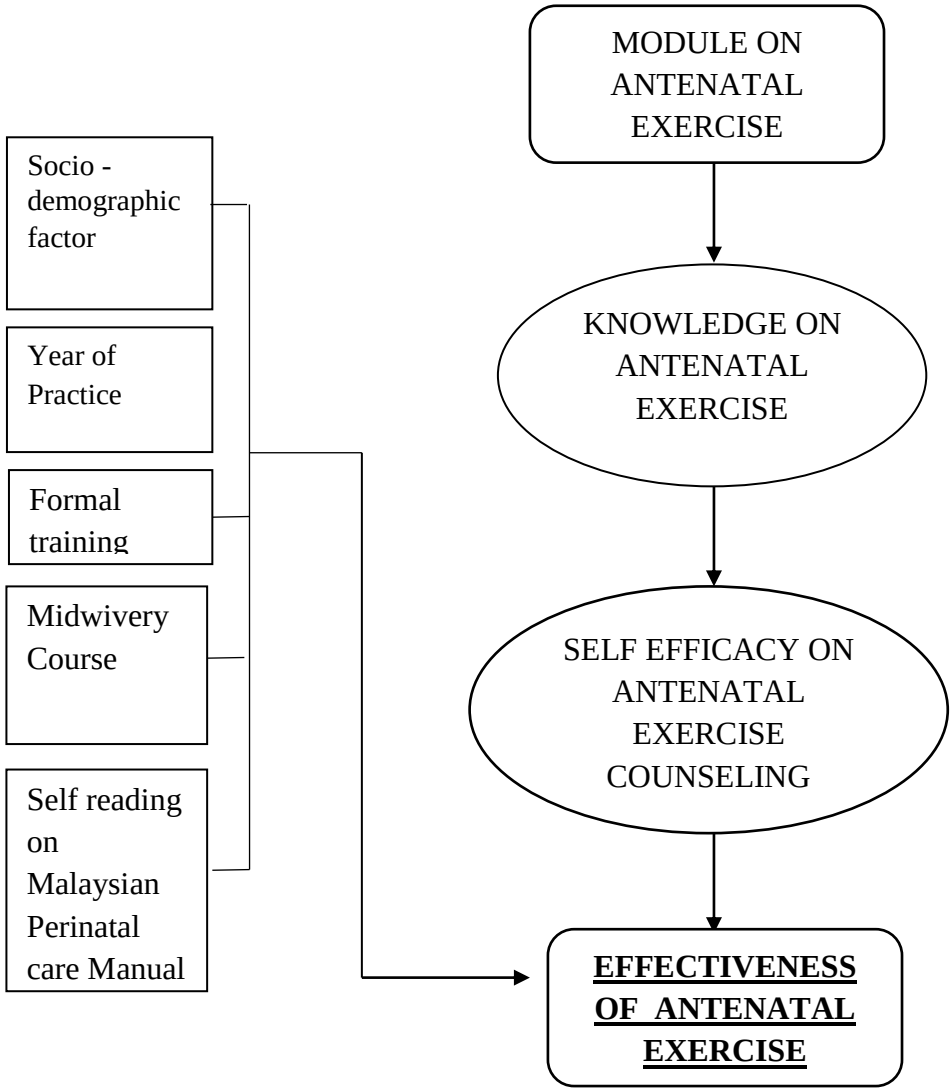

Figure 2.1: Conceptual framework

CHAPTER 3: RESEARCH OBJECTIVES

3.1 Research question

1. Is the knowledge on antenatal exercise counseling in intervention group higher than control group at 4 weeks?

2. Is the self efficacy on antenatal exercise counseling in intervention group higher than control group at 4 weeks?

3.2 General objective

To compare the effectiveness of antenatal exercise counseling module on knowledge and self efficacy between control and intervention groups at baseline and 4 weeks among staff nurses in Kelantan.

3.3 Specific objectives

1. To compare the mean score of knowledge on antenatal exercise counseling among nurses between control and intervention groups at baseline and 4 weeks.

2. To compare the mean score of self efficacy on antenatal exercise counseling among nurses between control and intervention groups at baseline and 4 weeks.

3.4 Research hypotheses

The mean knowledge score in intervention group is higher than control group at 4 weeks post intervention.

The mean self efficacy score in intervention group is higher than control group at 4 weeks post intervention.

3.5 Definition of operational terms

3.5.1 Knowledge on antenatal exercise counseling is defined as knowledge on antenatal exercise based on self developed 36-item questionaire.

3.5.2 Self-efficacy on antenatal exercise counseling is defined as individual's belief or level of confidence in delivering antenatal counseling based on self developed 7-item questionaire.

CHAPTER 4: METHODOLOGY

4.1 Study design:

Community based interventional study

4.2 Population & sample

4.2.1 Reference population:

Nurses in Kelantan

4.2.2 Source population

Nurses in health centres under Pasir Mas and Tumpat

4.2.3 Study population:

Nurses in 14 health centres in Pasir Mas and Tumpat who fulfilled the inclusion and exclusion criteria.

Inclusion criteria:

- working in the Maternal and Child Health Clinic for at least 6 months
- did not practise antenatal exercise counseling

Exclusion criteria:

- involve in managerial work only

4.2.4 Sampling method

Quasi randomization was applied in this study. Among 10 districts in Kelantan, two districts with almost similar demographic background(41, 42)(40, 41)(40, 41)(40, 41) were chosen, which were Tumpat and Pasir Mas. These two districs were both located in suburban area and were selected due to similarity in the sociodemographic and educational background of the clients and number of women in child bearing age. Tumpat has nine health clinics, which run MCH clinics while Pasir Mas has seven health clinics with MCH services(43)(42)(42)(42). Staff nurses from health centers in Pasir Mas were selected as the control group whereas nurses from Tumpat health clinics were selected as the intervention group. This was purposely done to avoid interaction or contamination between the control and intervention groups. Among all nurses in Pasir Mas and Tumpat, they were randomly selected to be included under control and intervention group respectively.

4.2.5 Sample size

The sample size was calculated after pilot study because no literature review was available for sample calculation. PS software for comparing 2 means was used in sample size calculation with the power of study of 80% and α level of 0.05.

α = level of significance was 0.05

power = $1 - \beta$ was 0.8

σ = Standard deviation of total knowledge score was 3.7 (pilot study)

δ = The expected difference in total knowledge score between the control group and intervention group was 2 (expert opinion).

m = The ratio of control group to intervention group was 1

The minimum sample size calculated was 55 subject for each group. Considering 20% drop-outs, the samples were 66 subjects for each group.

4.3 Research tools

1. Package for the intervention group
2. Package for the control group
3. Research questionnaire

4.3.1 Package for the intervention group

The intervention group were required to perform antenatal exercise counseling for at least 10 pregnant women without any medical or obstetric problems. They were given antenatal exercise module in the form of flip chart to facilitate them in delivering counseling. After the counseling, each woman was given take-home pamphlet as their reference. All the names of the pregnant women who received counseling need to be documented in the provided form.

4.3.1.1 Module & pamphlet development

A module (Appendix A) was developed based on current guidelines and manual available locally and inernationally. Literature search was carried out and recent information and recommendation on aerobic antenatal exercise was obtained. The module were mainly extracted from:

1. ACOG Commitee Opinion on Physical Activity and Exercise During Pregnancy and the Postpartum Period(4)
2. Malaysian Perinatal Care Manual (3rd edition) (6)
3. Malaysian Dietary Guideline 2010 (7)
4. Manual on Antenatal & Postnatal Exercise in Health Clinics by Malaysian Ministry of Health (8)

The gathered information was then compiled and the module was developed in the form of flipchart and pamphlet. The flipchart was designed to be attractive with colourful graphic and less words. It was a table-top flipchart so that both staff nurses and pregnant women can visualize the content at 1 to 2 feet distance. Relevant pictures depicting the antenatal exercise were included to draw women attention during the counseling session. It was designed in Malay Language which is the mother tounge of the local population. To help the women to understand better, the flipchart and pamphlet used the layman terms and simple language. Both education materials contain:

- Benefits of antenatal exercise
- Physiological changes in pregnancy
- Contraindications of antenatal exercise
- Exercises which are safe during pregnancy
- Exercises which should be avoided during pregnancy
- Guidelines on safe antenatal exercise
- Warning signs during antenatal exercise
- Structured antenatal and postnatal program under physiotherapist

The content of the pamplet and flip chart was reviewed by the experts in the particular area including Obstetrics and Gynaechology consultant, Family Medicine Specialist, Sport Medicine Specialist and physiotherapist. Correction and amendments was made accordingly to improve the content and the lay out of the flip chart and pamphlet. Subsequently, the education materials were revised back by the experts from each fields in a small meeting.

4.3.1.2 Module training

A special training was conducted by the researchers for the intervention group before using the module in their practice. They received two hours briefing and coaching on how to use the module. The content of the module was explained so that all nurses in the intervention group understood and correct information was delivered during the counseling session. They were given chances to clarify any of the statements written in