ISSN 2348-1218 (print)
International Journal of Interdisciplinary Research and Innovations ISSN 2348-1226 (online)
Vol. 6, Issue 3, pp: (638-642), Month: July - September 2018, Available at: www.researchpublish.com

# EFFECTIVENESS OF HEALTH BELIEF MODEL BASED EDUCATIONAL INTERVENTION ON OSTEOPOROSIS SELF EFFICACY SCALE AMONG FEMALE ACADEMICIAN IN MALAYSIA

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***Abstract:*** **The unawareness, under recognition and the consequential under treatment 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 to assess the osteoporosis self-efficacy based on Health Belief Model among female academician in Malaysia. A single blinded randomized controlled trial was conducted among 212 female academicians; intervention was conducted for 12 weeks; data was collected at baseline, immediately, one month and three months after intervention. Data was analyzed by Statistical Package for Social Sciences version 20. After intervention, from baseline to three months follow up there was a significant increase in the mean score of self-efficacy (22.4-25.9, p<0.001). Controlling for baseline socio-demographic data, the GLM model showed a significant difference between groups (F=4.68, p<0.001) and within groups for self -efficacy score (F=9.73, p<0.001). In conclusion, Health Belief Model had a positive effect on increasing self-efficacy, this study could be used as a model for promoting a healthy lifestyle in order to prevent osteoporosis in early stage.**

***Keywords:*** **Osteoporosis, Belief, Female, Health Belief Model, Malaysia.**

## I. INTRODUCTION

Osteoporosis is called the 'silent thief' because bone loss occurs without symptoms unless one has fractured. A fragility fracture may occur when bone loss the density and minor trauma such as fall from standing even fall from bed may leads to fracture. 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 [1-2]. 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. The objective of this study was to develop and evaluate the effect of an educational intervention based on Health Belief Model regarding osteoporosis self -efficacy among female academician in a public university, Malaysia.

## II. METHODS AND MATERIALS

This study was single blinded randomized controlled trial. The study population was full time female academician (age 25-55 Years); invited to participate with informed consent form. A multi-stage random sampling was used; respondents of

different faculties were randomized into intervention and control group; allocation concealment was implemented by sequentially numbered, opaque, sealed envelopes by the main researcher. 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. Health Belief Model was used as theoretical framework.

The osteoporosis self-efficacy scale (OSES) is a 21-item which measure the self-efficacy or confidence for behaviours related to physical activity and calcium intake [3]. The OSES has 2 subscales; exercise and calcium visual analogue scale which measured by a line from "Not at all confident" to "Very confident" measured exactly 10 cm (100 mm). Subjects were asked to rate their confidence about osteoporosis preventing activities which indicates their confidence that address exercise and calcium intake. The subject's score on each item should be measured to the nearest millimetre. In order to calculate the scores for each subscale (calcium and exercise), first add the scores for each item within the respective subscale, then divide the total score for each subscale (calcium and exercise) by the number of items in the respective scale to obtain the individual subscale score. The total possible for each subscale ranges from 0 to 100.

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. Data analysis was conducted using Statistical Package for Social Sciences (version 20). Descriptive and multivariate statistics (GLM) were used for analysing the data. 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. This research project has been granted ethical approval from the Ethical Review Board of Universiti Putra Malaysia (UPM/TNCPI/RMC/1.4.18.2) and registered under Australia New Zealand clinical trial which is available in following link: http://www.anzctr.org.au/ACTRN 12616001699459.

## III. RESULTS

### *A. Participants' Self-efficacy on Osteoporosis at Baseline*

Table I represents the mean self-efficacy score of participants in the intervention and control groups for each category of self-efficacy measurement at baseline. There was no significant difference between intervention and control groups. Although the intervention group had slightly higher total self-efficacy score than the control group, there was no significant difference between the two groups (p = 0.564). There was low level of total self-efficacy on osteoporosis among both groups.

**TABLE I: COMPARISON OF MEAN SELF-EFFICACY SCORES BETWEEN INTERVENTION AND CONTROL GROUPS AT BASELINE (N=212)**

| Osteoporosis Self-Efficacy category | | Intervention (n=114) n (%) | Control (n=98) n (%) | t value | p-value |
|---|---|---|---|---|---|
| Self-Efficacy Exercise Scale | (mean ± SD) | 12.76±3.04 | 10.25±3.50 | t = -1.317 | 0.190 |
| | (min-max) | (1-18) | (1-15) | | |
| Self-Efficacy Calcium Scale | (mean ± SD) | 13.04±2.96 | 13.91±2.12 | t = 0.073 | 0.642 |
| | (min-max) | (1-15) | (1-15) | | |
| Total Self-Efficacy Scale | (mean ± SD) | 22.41±3.18 | 21.01±3.07 | t = -1.581 | 0.564 |
| | (min-max) | (1-21) | (1-21) | | |
| *Significant at level p<0.05 | | | | | |

### *B. Between- group Comparison of Self-efficacy at Immediately After Intervention*

Table II describes the distribution and mean self-efficacy score of participants in the intervention group and control group immediately after intervention. Significant differences were found between control and intervention groups for both exercise and calcium self-efficacy subscale (p < 0.001) immediately after intervention. The findings of analysis self - efficacy show a significant increase on total self - efficacy after intervention in the intervention group.

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**TABLE II: COMPARISON OF MEAN SELF- EFFICACY SCORES BETWEEN INTERVENTION AND CONTROL GROUPS IMMEDIATELY AFTER INTERVENTION (N = 201)**

| Osteoporosis self-efficacy category | | Intervention (n=108) n (%) | Control (n=93) n (%) | t value | p-value |
|---|---|---|---|---|---|
| Self-Efficacy Exercise subscale | (mean ± SD) | 17.21±2.95 | 11.02±3.41 | -2.127 | <0.001* |
| | (min-max) | (1-18) | (1-15) | | |
| Self-Efficacy Calcium subscale | (mean ± SD) | 15.01±3.52 | 12.02±2.22 | -2.568 | <0.001* |
| | (min-max) | (1-15) | (1-15) | | |
| Total Self-Efficacy Scale | (mean ± SD) | 27.87±3.94 | 20.22±3.65 | -3.824 | <0.001* |
| | (min-max) | (1-21) | (1-21) | | |
| * Significant difference at p< 0.05 | | | | | |

***C. Between- group Comparison of Self-efficacy at One Month After Intervention***

Table III demonstrates the mean self-efficacy score of participants in the intervention group and control group one month after intervention. Significant differences were found between intervention and control groups for both exercise and calcium self-efficacy subscale ($p < 0.001$). The findings of analysis self - efficacy showed a significant increase on total self - efficacy after one month intervention in the intervention group.

**TABLE III: COMPARISON OF MEAN SELF-EFFICACY SCORES BETWEEN INTERVENTION AND CONTROL GROUPS ONE MONTH AFTER INTERVENTION (N = 193)**

| Osteoporosis self-efficacy category | | Intervention (n=103) n (%) | Control (n=90) n (%) | t value | p-value |
|---|---|---|---|---|---|
| Self-Efficacy Exercise subscale | (mean ± SD) | 16.21±3.85 | 10.22±3.01 | -2.089 | <0.001* |
| | (min-max) | (1-18) | (1-15) | | |
| Self-Efficacy Calcium subscale | (mean ± SD) | 16.33±2.92 | 11.38±2.12 | -1.957 | <0.001* |
| | (min-max) | (1-15) | (1-15) | | |
| Total Self-Efficacy Scale | (mean ± SD) | 26.27±3.44 | 19.92±3.20 | -3.919 | <0.001* |
| | (min-max) | (1-21) | (1-21) | | |
| * Significant difference at p< 0.05 | | | | | |

***D. Between- group Comparison of Self-efficacy at Three Months After Intervention***

Table IV describes mean self-efficacy score of participants in the intervention group and control group three months after intervention. Significant differences were found between intervention and control groups for both exercise and calcium self-efficacy subscale ($p < 0.001$). The findings of analysis self - efficacy showed a significant increase on total self - efficacy after three months of intervention in the intervention group.

**TABLE IV: COMPARISON OF MEAN SELF-EFFICACY SCORES BETWEEN INTERVENTION AND CONTROL GROUPS THREE MONTHS AFTER INTERVENTION (N = 193)**

| Osteoporosis self-efficacy category | | Intervention (n=103) n (%) | Control (n=90) n (%) | t value | p-value |
|---|---|---|---|---|---|
| Self-Efficacy Exercise subscale | (mean ± SD) | 15.21±3.11 | 10.31±2.99 | -2.134 | <0.001* |
| | (min-max) | (1-18) | (1-15) | | |
| Self-Efficacy Calcium subscale | (mean ± SD) | 16.48±3.52 | 11.41±3.01 | -1.523 | <0.001* |
| | (min-max) | (1-15) | (1-15) | | |
| Total Self-Efficacy Scale | (mean ± SD) | 25.94±3.07 | 19.02±3.97 | -3.228 | <0.001* |
| | (min-max) | (1-21) | (1-21) | | |
| * Significant difference at p< 0.05 | | | | | |

***E. Within-Group Comparison of Self-efficacy on Osteoporosis***

Tables V compares change in the self-efficacy categories of the participants from baseline to three months after intervention for the intervention and control groups respectively. Using pair t-test in the control group, the mean self-efficacy on exercise and calcium intake decreased significantly at post-test ($p = 0.006$ and $p < 0.001$ respectively). In the intervention group, the mean exercise and calcium intake significantly were increased after intervention ($p < 0.001$).

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Overall the results indicate that participants in the intervention group had greater self-efficacy in exercise and calcium intake on osteoporosis. Therefore, the educational intervention study had a positive effect among female academicians.

**TABLE V: COMPARISON OF CHANGES IN SELF- EFFICACY SCORES OF PARTICIPANTS IN THE INTERVENTION AND CONTROL GROUPS FROM BASELINE TO THREE MONTHS AFTER INTERVENTION (N=193)**

| Osteoporosis Self efficacy category | | Pretest (mean ± SD) | Post test (mean ± SD) | Mean change | t-value | p-value |
|---|---|---|---|---|---|---|
| Exercise subscale | Control | 10.25±3.50 | 10.31±2.99 | -0.06 | 1.235 | 0.006 |
| | Intervention | 12.76±3.04 | 15.21±3.11 | +2.45 | 2.588 | <0.001 |
| Calcium subscale | Control | 13.91±2.12 | 11.41±3.01 | -2.50 | 1.295 | <0.001 |
| | Intervention | 13.04+2.96 | 16.48±3.52 | +3.44 | 3.501 | <0.001 |
| Total | Control | 21.01±3.07 | 19.02±3.97 | -1.99 | 2.471 | 0.485 |
| | Intervention | 22.41±3.18 | 25.94±3.07 | +3.53 | 3.683 | <0.001 |
| *Significant difference at p<0.05 | | | | | | |

***F. Between and within group's comparison of Self-efficacy using GLM repeated measures***

The effect of intervention on changes in self-efficacy measurements was further analysed by using the GLM repeated measures test. The GLM model was applied to detect the differences in change within and between groups for continuous data and controlling for baseline socio-demographic data. The results show a significant difference between groups ($F = 4.68$, $p < 0.001$) and within groups for self-efficacy score ($F = 9.73$, $p < 0.001$). Bonferroni adjusted alpha calculated to test the null hypothesis (adjusted alpha = 0.008) for pairwise comparisons of time between intervention (Table VI) and control group (Table VII).

**TABLE VI: COMPARISON OF CHANGE IN KNOWLEDGE SCORE WITHIN INTERVENTION GROUP USING GLM REPEATED MEASUREMENTS (N = 103)**

| Time (I) | Mean ± SD | Time (J) | Mean difference (J-I) | t-value | p-value |
|---|---|---|---|---|---|
| 1 | 22.41±3.18 | 2 | +5.46 | -11.213 | <0.001* |
| | | 3 | +3.86 | -9.256 | <0.001* |
| | | 4 | +3.53 | +7.485 | <0.001* |
| 2 | 27.87±3.94 | 3 | -1.6 | +1.235 | 0.058 |
| | | 4 | -1.93 | -4.875 | <0.001* |
| 3 | 26.27±3.44 | 4 | -0.33 | -3.875 | <0.001* |
| 4 | 25.94±3.07 | | | | |
| T1: Pretest, T2: Posttest, T3: One-month follow-up, T4: Three-month follow-up<br>* Significant difference at level< 0.008 | | | | | |

**TABLE VII: COMPARISON OF CHANGE IN KNOWLEDGE SCORE WITHIN CONTROL GROUP USING GLM REPEATED MEASUREMENTS (N = 90)**

| **Table 4.32.** | | | | | |
|---|---|---|---|---|---|
| **Control group (N= 90)** | | | | | |
| Time (I) | Mean ± SD | Time (J) | Mean difference (J-I) | t-value | p-value |
| 1 | 21.01±3.07 | 2 | -0.79 | +2.681 | 0.005* |
| | | 3 | +1.09 | -1.582 | 0.254 |
| | | 4 | -1.99 | -0.047 | 0.687 |
| 2 | 20.22±3.65 | 3 | +0.30 | -2.874 | 0.006* |
| | | 4 | +1.20 | +0.074 | 0.475 |
| 3 | 19.92±3.20 | 4 | +0.90 | -5.425 | <0.001* |
| 4 | 19.02±3.97 | | | | |
| T1: Pretest, T2: Posttest, T3: One-month follow-up, T4: Three-month follow-up<br>* Significant difference at level< 0.008 | | | | | |

## IV. DISCUSSION

In this current study, at baseline, the total mean self-efficacy score intervention and control group was not significantly different, but a significant difference was found between the total mean self-efficacy score between intervention and control group after intervention which was consistent even after three months of follow up. The intervention group reported more confidence in beginning an exercise program, changing exercise habits, exerting the effort required to exercise, attempting difficult exercises, exercising for the appropriate length of time, and doing exercises that will help reduce the risk of osteoporosis for osteoporosis self-efficacy exercise subscale and consume adequate amounts of calcium rich foods, change your diet to include more calcium rich foods, select appropriate foods to increase your calcium intake, take calcium supplements if you don't get enough calcium diet for osteoporosis self-efficacy calcium subscale. Chan et. al., (2007) utilized Health Belief Model as a framework to measured osteoporosis self-efficacy [4]. After intervention, it was observed that the experimental group statistically significantly increases osteoporosis self-efficacy score ($p<0.001$) which is consistent with our finding.

## V. CONCLUSION

Self-efficacy is the most important predictors of whether an individual engages in osteoporosis preventing behaviours. This study supports Health Belief Model based educational intervention program which was effective strategies in promoting osteoporosis self-efficacy; which could be used as a model for promoting a healthy lifestyle in order to prevent osteoporosis in early stage. The findings also support the need to raising public and community awareness toward osteoporosis including extent of the problem, risk factors, signs, complications, diagnosis and preventive awareness campaigns and community mobilization.

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