The longitudinal effects of a perimenopausal health education intervention on the mid-life women in Taiwan

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Abstract

Objectives: The study purpose was to evaluate the longitudinal effects, after 3 months and 1-year, of a perimenopausal health education intervention for mid-life women in Taiwan.

Methods: This study was conducted at two hospitals and their neighborhood communities (each included three subgroups, traditional Chinese, gynecologic and neighborhood communities), using a parallel-design, control trial for mid-life women. There were three instruments: (1) the Perceived Uncertainty Scale, (2) the Perceived Perimenopausal Disturbances Scale and (3) the Practice of Health Behaviors Scale. The intervention effects from the study baseline to a 1-year follow-up were estimated using the mixed effect model (SAS-MIXED procedure) for repeated measures of health behaviors, perceived uncertainty and perceived perimenopausal disturbances.

Results: A total of 161 women were in the education group, while 174 women were in the control group. After a 1-year follow-up, health education intervention had significantly increased the practice of health behavior in both Chinese medicine subgroups (β = 15.39, P < 0.001) and gynecologic clinics subgroup (β = 10.08, P < 0.005). On the other hand, health education intervention had significantly decreased perceived uncertainty in subgroups of Chinese medicine (β = -9.52, P < 0.005).

Conclusions: The perimenopausal health education had positive effects in reducing perceived uncertainty and increasing practice of health behavior among women from Chinese medicine clinics after a 1-year follow-up. Women from the gynecologic clinics showed the intervention effects of increasing health behavior after a three month and 1-year follow-ups. However, the women from neighborhood communities did not show any significant intervention effects at follow-ups. It is important to urge the women...
from communities to promote health practices for their perimenopausal transition instead of just living with their changing health.

Keywords: Longitudinal effects on health education; Perimenopause; Mid-life women

1. Introduction

Health care professionals should approach and treat clients according to the women’s individual values about menopause issues [1–4]. Studies have suggested that women need health education or information to be able to make informative decisions about their own health, reducing uncertainty associated with menopause or exercising health behavior [5–9].

In the light of the findings of the Heart and Estrogen/Progestin Replacement Study (HERS) Study, it is argued that more evidence is needed about the effects of hormone replacement therapy (HRT) on heart disease prevention. In addition, the results are also compelling reasons for women to assess management of menopause and diseases from possible heart disease, osteoporosis and other diseases in advanced age [10–12]. These findings argued that perimenopausal women need health education to empower their self-care of their perimenopausal health problems instead of just using HRT.

Hunter and O’Dea’s study [13] showed that health education for middle-aged women had a long-term impact and helped women deal emotionally and practically with menopausal symptoms. In Tsao and Huang’s study [14], the results indicated short-term (3 months after health education) effects of perimenopausal health education. The health education significantly reduced scores of the experimental group concerning perimenopausal disturbances and reported increasing practices of healthy behaviors compared to the control group. However, the longitudinal effects about the above inferences could not be addressed in that short-term design. Therefore, the purpose of this study was to evaluate the longitudinal effects of a health education intervention on perimenopausal women. The intervention group and the control group were compared for changes after 3 months and 1 year later. The effectiveness of the health education was measured by three variables, perimenopausal disturbance and the practice of health behaviors.

2. Methods

2.1. Study subjects

This study was conducted at two hospitals and their neighborhood communities (each included three subgroups, traditional Chinese, gynecologic and neighborhood communities), using a parallel-design, control trial for mid-life women. There were three instruments: (1) the Perceived Uncertainty Scale, (2) the Perceived Perimenopausal Disturbances Scale and (3) the Practice of Health Behaviors Scale. Six data collection sites were therefore selected: a hospital-associated gynecologic clinic, a traditional Chinese medicine clinic and a neighborhood community in two different regions of northern Taiwan. The two hospitals are 26 miles apart; women in each group lived far enough apart that the control group would not be contaminated by the study group or vice versa. Basically, physicians of both hospitals remained in the same clinic environment or site. Physicians of both hospitals did not provide any other additional health education for women during the study periods. In addition, there was no site crossover of physicians and other providers in this study to avoid the possible information bias.

Perimenopause is defined as the transition period immediately prior to menopause when endocrinological, biological and clinical features of approaching menopause commence, continuing for at least the 1st year after the menopause [15]. The duration of perimenopause may be 2–5 years and usually occurs from ages 48 to 52 [16]. However, perimenopause may span a 25-year continuum from age 35 to age 60 [17]. Therefore, in these study mid-life women aged 40–55 were recruited. Mid-life women who visited clinics for menopausal health problems or concerns were referred to the study by hospital physicians or
nurses. Women in the neighborhood community were recruited by research assistants (RAs) or researchers that were public health nursing major and familiar with the ethnohistory and demographic information of the neighborhood community. Some women were referred by public health nurses or by other persons familiar with the study, such as the participating women in the current study. Both the education and control groups were pre-tested with three questionnaires. Subsequently, an education intervention was implemented for the experiment group. Three months and 1 year later both groups were post-tested using the same three questionnaires and compared changed scores. An application for permission to conduct this study was approved by the committee on Protection of Human Subjects at Chang Gung Memorial Hospital and health department of neighborhood community. Written informed consent was obtained from each woman prior to enrollment in the study. All participants knew that they were going to have a test 3 months and 1 year later. They were also informed that they were volunteer participants in the study and they had the right to refuse to participate and the right to withdraw at any time without jeopardy.

2.1.1. Intervention

A standard intervention protocol with the same intensity was designed and used across all sites. First, the research team designed the health teaching brochure. Then the researcher and the same RAs took care of one group women for their perimenopausal health education. In experimental group, each woman received the same health education intervention under the guidance of Perimenopausal Health Education Brochure (PHEB): (1) 1 h formal one to one perimenopausal health teaching under the guidance of perimenopausal health teaching brochure. (2) There were at least two individual follow-up consultations. Women would clarify their health concerns during follow-up interviews. (3) Free telephone consultations with a familiar RA or researcher for their perimenopausal personal health concerns.

(1) One hour formal personal instruction about PHEB: RAs provided the brochure and provided a 0.5–1 h to explain the contents of the brochure and freely discuss perimenopause for individual woman in the experimental group at the clinics or at the woman’s home in the neighborhood community.

The 32-page perimenopausal health education brochure was written by the researchers titled, “Health care for perimenopausal women—greeting a happy and healthy perimenopause,” and features seven short chapters:
- greeting a happy and healthy perimenopause;
- understanding perimenopause;
- the changes of the body and mind during perimenopause;
- self-care for perimenopausal women;
- the perspectives of perimenopause by Western medicine physicians, traditional Chinese medicine physicians and socio-cultural expertise;
- the prevention of diseases during perimenopause;
- health care summary.

The brochure features easy-to-understand explanations that include narrative stories and testimonies about actual experiences of perimenopausal women from a previous qualitative study by one of the researchers [18]. To increase the reader’s interest, hand-drawn illustrations about perimenopausal health issues were used.

(2) Individual follow-up consultations (at least twice): Women would clarify their health concerns during follow-up interviews.

(3) Free telephone consultation with a familiar RA or researcher: Chinese women viewed perimenopause as a very private personal issue. They liked to share or ask some personal health issues about perimenopause with a familiar person. Therefore, The RA or researcher would leave their contact telephone number to participating women for continuing consultation about their health issues and perimenopause.

In addition, for ethical reasons the women in the control group received a copy of the brochure at the end of the study instead of at the beginning of the study. It provided women in control group as self-educating material.

2.1.2. Data collection

There were three instruments: (1) the Perceived Uncertainty Scale; (2) the Perceived Perimenopausal Disturbances Scale; (3) the Practice of Health Behav-
iors Scale. Each woman was assessed three times: (1) pre-test, before receiving the intervention for the intervention group or at the beginning of the study for the control group; (2) post-test, 3 months after the intervention for the intervention group or 3 months after pre-test for the control group; (3) after post-test, 1 year after the intervention for the intervention group or 1 year after pre-test for the control group. The reliability (Cronbach’s alphas) of the three questionnaires are 0.92 for the uncertainty scale, 0.84 for the perimenopausal disturbance scale and 0.87 for health behaviors scales in previous pilot studies [9]. Because menopausal issues are very personal issues to Taiwanese women and some of them do not like to discuss them openly, printed materials were developed and individual consultation was used. Taiwanese women prefer to share their perimenopausal issues with familiar persons and privately [18]. From this cultural perspective, Taiwanese women like to share their perimenopausal issues with familiar persons. Therefore, in the current study, the assessments of these three questionnaires were carried out by the same RAs from study baseline to follow-up periods. All RAs were experienced in data collection for four previous related studies ([4,9,14,18]) and well-trained by the researchers prior to the initiation of this study. In addition, all RAs were also well-trained to report objectively on all data collection and discussed regularly with researchers during the study periods to prevent the information bias. Furthermore, all participants and RAs were ‘blinded’ for the purpose of evaluating the effects in health education intervention; therefore, possible self-reporting bias may belong to non-differential misclassification bias which would underestimate the risk, so the real effect between two groups would be stronger.

2.1.3. Perceived Uncertainty Scale

The level of perceived uncertainty was measured using 20 questions that employed a 5-point Likert-type scale ranging from strongly disagree to strongly agree. The scale was modified from the Chinese version of Mishel’s Uncertainty in Illness Scale [19]. Higher scores reflect higher uncertainty. This scale had a Cronbach’s α of 0.87.

2.1.4. Practice of Health Behaviors Scale for perimenopause

The frequency of practicing health behaviors for perimenopause was measured using a 5-point Likert-type scale (100, 75, 50, 25 or 0%). The scale has 23 items that measure four dimensions of health behavior: choosing healthy diets, doing regular and weight bearing exercise, self-care to prevent diseases and improving one’s own mental health. This scale had a Cronbach’s α of 0.86. Higher scores reflect more frequent practice of healthy behaviors.

2.1.5. Perceived Perimenopausal Disturbances Scale

Perceived perimenopausal disturbances were evaluated by measuring subjective perimenopausal symptoms. The scale was modified by researchers’ previous qualitative studies [4,18]. Thirty-eight items with five main categories of symptoms were measured, namely, vasomotor, muscular-skeletal, urologic, reproductive and psychological symptoms. Each item was given a score of 1–4, where a higher score indicated greater discomfort for perimenopausal symptoms and a stronger influence on daily life. A lower score indicated less discomfort and slight or zero influence on daily life. This scale had a Cronbach’s α of 0.95.

2.1.6. Statistical analysis

The progressions of study variables between the intervention and control groups were described for the study baseline and follow-up periods, respectively. To assess differences between the groups’ health behavior, perceived health uncertainty and perceived perimenopausal disturbances changes, we used mixed model software (SAS-MIXED procedure) for repeated measures [20]. The mixed model has been proposed as an appropriate method to make the repeated measurement analysis. The PROC Mixed, a recently developed statistical procedure by the SAS Institute, was used in these analyses [21]. The PROC Mixed is a generalization of the standard linear model designed to estimate and test the significance of between- and within-group effects, controlled by factors associated with repeated observations of the same subject. All tests of hypotheses were performed at the 5% significance level by using an intent-to-treat analysis.

3. Results

At the beginning and post-test (after 3 months of intervention), there were 179 women in the interven-
tion group, while there were 174 women in the control group. After 1 year of intervention, 161 women were in the education group and 174 women were in the control group. 18 women in the intervention group withdrew because of household relocation. There were no significant differences of menstrual status and other baseline characteristics between women who dropped out and those who did not.

Table 1 gives the baseline characteristics of participants in the two groups. Women in the control group were more likely educated only at the elementary school level than women in the intervention group. In addition, there were no significant differences in the other demographic data, such as age stratum, marital status, vocation, family type and menstrual status.

Table 2 portrays the intervention effects (population average) on study variable changes at the three follow-ups in the proposed mixed-effects model. The reason for using the mixed model in the current study was to integrate the baseline and follow-up data and to adjust the dependence of variables, e.g. perceived health uncertainty at the three follow-ups were not independent. In the mixed-model analyses, both between- and within-person effects can be tested in a single analysis, a robust advantage over prior evaluations of self-comparable relations. After adjusting for education levels, on the practice of health behavior, the intervention effect estimates revealed significant changes after a 3-month follow-up especially in gynecologic clinics subgroup ($\beta = 9.10, P < 0.05$). However, after 1-year follow-up, significant changes were shown in both the Chinese medicine subgroup ($\beta = 15.39, P < 0.001$) and in gynecologic clinics subgroup ($\beta = 10.08, P < 0.005$). Fig. 1 shows the changes in health behavior over time at pre-test and follow-ups stratified by three intervention subgroups.

In terms of perceived uncertainty, the estimates of intervention effect showed significant changes in the subgroups using Chinese medicine ($\beta = -9.52, P < 0.005$) after 1-year follow-up. It also should be noted that the perceived uncertainty of the women recruited from the gynecologic clinics and from the neighborhood community has essentially decreased but did not show significant changes varying with time whether in the intervention group or in the control group. Fig. 2 shows the changes in perceived uncer-
Table 2
The fixed intervention effects\(a\) (population-average) for perceived perimenopause disturbance, health perceived uncertainty and practice of health behaviors changes at baseline (pre-test) and two follow-up-assessments in the proposed mixed-effects model

<table>
<thead>
<tr>
<th></th>
<th>Chinese medicine clinics</th>
<th>Neighborhood community</th>
<th>Gynecologic clinics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(\beta)</td>
<td>(P)-value</td>
<td>(\beta)</td>
</tr>
<tr>
<td><strong>Perceived perimenopause disturbance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-test vs. pre-test</td>
<td>1.69</td>
<td>0.193</td>
<td>4.00</td>
</tr>
<tr>
<td>After-post-test vs. pre-test</td>
<td>-3.53</td>
<td>0.225</td>
<td>-2.70</td>
</tr>
<tr>
<td>Group(^a) time (intervention vs. control)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Post-test vs. pre-test</td>
<td>-6.62</td>
<td>0.001**</td>
<td>-1.37</td>
</tr>
<tr>
<td>After-post-test vs. pre-test</td>
<td>-3.14</td>
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</tr>
<tr>
<td><strong>Health perceived uncertainty</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Time</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Post-test vs. pre-test</td>
<td>-3.88</td>
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<tr>
<td>After-post-test vs. pre-test</td>
<td>-1.40</td>
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<td>-7.68</td>
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<tr>
<td>Group(^a) time (intervention vs. control)</td>
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<tr>
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<td>-1.38</td>
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<td>0.005**</td>
<td>1.06</td>
</tr>
<tr>
<td><strong>Practice of health behaviors</strong></td>
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<td></td>
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<tr>
<td>Time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-test vs. pre-test</td>
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<td>0.441</td>
<td>1.68</td>
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<tr>
<td>After-post-test vs. pre-test</td>
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<td>0.786</td>
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<tr>
<td>Group(^a) time (intervention vs. control)</td>
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<tr>
<td>Post-test vs. pre-test</td>
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<td>0.084</td>
<td>3.76</td>
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<tr>
<td>After-post-test vs. pre-test</td>
<td>15.39</td>
<td>0.001**</td>
<td>3.81</td>
</tr>
</tbody>
</table>

\(a\) Adjusting for education level.

* \(P<0.05\).

** \(P<0.01\).

*** \(P<0.001\).

In terms of the perimenopausal disturbances, although a significant decrease (\(\beta = -6.62, P = 0.003\)) was found in the subgroup of Chinese medicine after 3 months, the intervention effect estimates indicated no significant changes or consistent trend after 1-year follow up in each subgroup. Fig. 3 shows the changes.

Fig. 1. Changes in the practice of health behavior over time at pre-test and follow-ups (post-test and after-post-test) The data are displayed stratified by three intervention subgroups and shown as mean ± S.E.M. (error bars).
in perceived perimenopause disturbance over time at pre-test and follow-ups stratified by three intervention subgroups.

4. Discussion and conclusion

The current studies have shown that the estimates of the intervention effect had significant changes in terms of the perceived uncertainty and the practice of health behavior in the subgroups of Chinese medicine after 1-year follow-up but did not show significant decrease at a 3-month follow-up. Women may feel frustrated due to their bodily changes, health knowledge ambiguity and the lack of accurate information about perimenopausal health related issues. Healthcare providers should provide consistent and multidimensional perimenopausal health knowledge or medical service to reduce women’s perceived uncertainty [9]. The results implied that the women using Chinese medicine for their perimenopausal health problems needed longer time (at least 1 year) to improve their psychological uncertainty and healthy life style. Most of Chinese medicine or herbs emphasize warm, holistic approaches; however, the prolonged effects for treating health problems may account for this phenomenon.

The women in gynecologic clinics showed significant intervention effects of practicing health behaviors after a period of 3 months and 1 year, but did not show significant intervention effects on the perceived uncertainty. This finding is the same as that of Tsao’s previous study but is inconsistent with the findings of Lemaire and Lezs’ [5] report. According to Lemaire and Lezs’ [5] study, the effect was made immediately after the education intervention; however, in current...
studies the post-test and after post-test was administered 3 month and 1 year. From another perspective, women were afraid that HRT’s side effects may make women perceive uncertainty. Therefore, our health education should provide more HRT self-care issues for women, such as what the benefit and risk of using HRT are and how to monitor and follow-up the side effects of using HRT to reduce women’s perceived uncertainty in gynecological clinics.

Women in the community showed increased perceived uncertainty, the practice of health behavior and fluctuation of perceived perimenopausal disturbance in post-test or after-post test. However, these changes did not show significant intervention effects. Previous studies showed that women from communities were supposed to use natural approaches without using medicine to deal with their perimenopausal health issues. These women saw the perimenopause as, such as natural process, thus living with their changing health without need for medicine treatment. However, on the other hand, they did need health education of perimenopause [22]. Furthermore, current studies showed that there were no significant effects of the health education on community women. These results suggested we should reconsider the strategies and contents of perimenopausal health education. It is crucial to urge the community women to promote their perimenopausal transition instead of just living with their changing health silently.

Our study showed that most changes in perceived perimenopausal disturbances fluctuated. A slightly lower in perceived perimenopausal disturbances were in the intervention subgroups of the gynecologic clinics, Chinese medicine clinics and the control subgroups of gynecology clinics and communities. These results demonstrated that our health education makes no effects on the significant decrease of perimenopausal disturbance. Therefore, we should focus on the self-management of perceived perimenopausal disturbance in future health education.

In addition, after adjustments of the educational level, the comparison of the changes of study variables remained the same. This result is the same as a precursor of current studies [14]. This finding implied that the teaching strategies may fit any formal educational level, and that its effects can last for 1 year.

Several possible limitations of this study should be considered in interpreting the results. In the current study, we found that the score of “practice of health behavior” fluctuated during the follow-up periods in all three control groups. By contrast, the experimental group from three sites all showed an increase in the score of the practice of health behavior. The mixed model which has been proposed as an appropriate method to make the repeated measurement analysis had further indicated that there was a significant interactive effect between intervention and follow-ups in the Chinese and gynecologic clinics.

Nevertheless, since there were few high scores of practice of health behavior in the control group from gynecologic clinics, it may be due to the effects of HRT advertisements in gynecologic clinics in the beginning of this study. Confounder bias of this issue should be considered in interpreting the results and as our study results were applied to a Chinese population. More ethic studies will be needed.

On the other hand, perceived perimenopausal disturbance showed a higher score in Chinese medicine clinics than in gynecologic clinics. This finding is similar in our previous study. The primary factor associated with higher self-perceived severity of perimenopausal symptoms in traditional Chinese medicine clinics rather than in Western medicine clinics was their frequently seeking medical advice between Chinese medicine clinics and gynecologic clinics [4]. In order to ensure women in each group lived far enough apart that the control group would not be contaminated by the study group or vice versa, the current study selected two hospitals which are 26 miles apart and have the same administrative level and clinic environment. However, Fig. 3 also shows that there was lower score of perceived perimenopausal disturbance in control group than in experimental groups at both two hospital sites. It may be the perceived perimenopausal disturbance is a self-reported and subjective experience. Based on the cultural perspective and previous qualitative study results, we found some women may use “self-endure” on reporting their perimenopausal disturbance. In view of the differences at baseline, the control group women seemed to be more reserved in expressing their perimenopausal disturbance than the experimental group women. Therefore, selection bias of this issue should be considered in interpreting the results as our study results were applied to a Chinese population and to reiterate, more ethic studies should be available for study.
Nevertheless, the current study sought to emphasize the higher variation within groups of perceived perimenopausal disturbance. Only women from the experimental group of Chinese medicine clinics have a lower score in the follow-up period. Similar findings in our previous study also showed that there was less than 20% of women correctly answered the items that measured self-management of symptoms related to perimenopause among a perimenopausal knowledge of 353 mid-life women [23]. The health education of self-management for perimenopausal disturbance requires further study.

Finally, as there were no significant differences of menstrual status and other baseline characteristics between women who dropped out and those who did not, so the loss to follow-up bias would not be noticeably important.

In conclusion, the perimenopausal health education had positive effects in reducing perceived uncertainty and increasing practices of health behaviors among women from Chinese medicine clinics after a 1-year follow-up. Women from gynecologic clinics showed the intervention effects of increasing health behavior after a 3-month and 1-year follow-up. The women from the communities did not show any significant intervention effects at post-test (after 3 months) and after post-test (after 1 year). The current study suggests that future perimenopausal health education should add detailed content about self-management of perceived perimenopausal disturbance and the self-care knowledge about the safety of taking a hormone therapy. In addition, it is important to urge the community women in health promotion for their perimenopausal transition instead of just living with their changing health. It would be challenging to design more active health education for healthy perimenopausal women in communities.

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We confirm that the patient/person(s) have read this manuscript and given their permission for it to be published in PEC.

References