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Kertas Asli/*Original Article*s

Development and Evaluation of a Booklet on Nutrition Education for Falls Prevention among Older Adults

(Pembentukan dan Penilaian Buku Kecil Panduan Pemakanan bagi Pencegahan Pencegahan Jatuh dalam Kalangan Warga Emas)

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ABSTRACT

The incidence of falls among older adults can be caused by nutritional, health status, physical and environmental factors. The objective of this study was to develop and evaluate the contents in a booklet on nutrition and falls prevention among older adults as a nutritional education material for falls prevention. In Phase I, market survey in bookstore, website search and need assessment among 30 respondents using a questionnaire was conducted. Results from Phase I were used to form a 32-page A5 size booklet that includes information on nutrients related to bone health, recommendations of high protein and calcium menus, ideal exercise and tips to avoid falls in older adults. The content validity of the booklet was conducted among six health professionals to assess the suitability and understanding in Phase II. The content of the booklet (Phase III) was then evaluated among 24 respondents aged 60 years and above. From the need assessment in Phase I, majority of respondents chose 7 to 9 for the score of each questions which indicates the need for all information to be included in the booklet. For Phase II, criteria with highest average score were composition and typography with a score of 60%. For Phase III, most respondents chose "good" for all the criteria stated except for pictures (satisfactory), while 62.5% of respondents stated that they were satisfied with the information contents in the booklet. In conclusion, this booklet can be used as one of the strategies for nutrition education in the prevention of falls among older adults.

Keywords: Older adults; falls; nutritional education material; booklet

ABSTRAK

Kejadian jatuh dalam kalangan warga emas boleh disebabkan oleh faktor pemakanan, status kesihatan dan faktor persekitaran. Kajian ini dijalankan untuk membentuk dan menilai buku panduan kecil pemakanan dan jatuh dalam kalangan warga emas sebagai satu bahan pendidikan pemakanan dalam pencegahan jatuh. Dalam Fasa I, tinjauan pasaran di kedai buku, carian di laman sesawang dan tinjauan keperluan ke atas 30 responden menggunakan borang soal-selidik telah dijalankan. Hasil daripada Fasa I digunakan untuk membentuk buku kecil bersaiz A5 sebanyak 32 muka surat yang memasukkan maklumat nutrien berkaitan kesihatan tulang, saranan menu yang tinggi protein dan kalsium, senaman yang sesuai untuk warga emas serta tips untuk mengelakkan jatuh. Kesahan kandungan dilakukan dalam Fasa II dalam kalangan enam orang ahli profesional bidang kesihatan untuk menilai kesesuaian dan kefahaman terhadap buku kecil yang telah dibentuk. Penilaian buku kecil (Fasa III) dijalankan dalam kalangan 24 orang responden yang berumur 60 tahun dan ke atas. Hasil penilaian keperluan Fasa 1 mendapati majoriti responden memilih skor 7 hingga 9 untuk setiap soalan yang menunjukkan keperluan untuk semua maklumat dimuatkan di dalam buku kecil. Untuk Fasa II, kriteria yang mendapat purata skor tertinggi adalah kriteria susunan dan tipografi dengan skor 60%. Bagi Fasa III, kebanyakan responden memilih "bagus" untuk semua kriteria yang dinyatakan kecuali gambar (memuaskan), manakala 62.5% responden menyatakan bahawa mereka berpuas hati terhadap maklumat yang dimuatkan dalam buku kecil. Kesimpulannya, buku kecil ini boleh dimanfaatkan sebagai salah satu strategi untuk pendidikan pemakanan dalam mencegah jatuh dalam kalangan warga emas.

Kata kunci: Warga emas; jatuh; bahan pendidikan pemakanan; buku kecil

INTRODUCTION

Ageing is associated with several physiological changes that can lead to risk of illnesses and dependency in older adults. Approximately, 15-34% community dwelling Malaysian older adults experienced a fall annually (Ibrahim et al. 2017a; Ibrahim et al. 2017b; Rizawati & Mas Ayu 2008; Singh et al. 2015). Falls risk was higher among older adults at residential institutions (Singh et al. 2014). A large cohort study has reported that falls was the highest geriatrics problems (19%) experienced by the older adults (Hussin et al. 2015). The prevalence of falls among Singaporean older adults was 17.2% (Chan et al. 1997). In Australia, nearly one million older adults experienced falls annually (Sherrington & Tiedemann 2015). In addition, loss of muscle mass can lead to osteoporosis which increase the risk of falls and fall related injuries (Guglielmi et al. 2008).

A fall was defined as "an event where an individual coming to rest on the ground or floor or other lower inadvertently" (World Health Organization 2012). Fall can be caused by extrinsic and intrinsic factors. Extrinsic factors are associated with the environment that can trigger someone to slip and fall (Tromp et al. 2001). On the other hand, intrinsic factors include medication usage, ageing, health status, nutritional status, orthopedic problems and sedentary lifestyle (Fabrício et al. 2016) . For example, reduced muscle and bone mass due to insufficient intake of vitamin D, protein and calcium are related with the risk of falls (Raynaud-Simon, 2009). Adequate protein intake by older adults was suggested as a potential modifiable risk factor of falls (Zoltick et al. 2011). Similarly, older adults with malnutrition were shown to have a higher risk of falls (Singh et al. 2014). The incidence of physical frailty and cognitive decline was also found to be associated with falls in older adults, resulting in higher rate of mortality in this group (Ensrud et al. 2009; Won et al. 2014).

It is important to plan and implement falls prevention strategies to prevent further falls related complications. Nutrition intervention for falls prevention has mainly focusing at achieving adequate nutrition and reducing nutrient deficiencies to improve nutritional status of the older adults (Esquivel 2018). In addition, a study in Taiwan has highlighted the importance of nutritional status as the main predictor of falls among community dwelling older adults (Chien & Guo 2014). One of the most important strategy is to provide falls prevention education and knowledge that should include nutrition and physical activity aspects. This is in accordance with the Orlando Task Force, which suggested three major treatments for effective frail prevention which include calorie and protein support, vitamin D and exercise (Morley et al. 2013). Physical activity and exercise are some of the evidence based practice falls prevention intervention recommended (NICE 2013). This intervention is beneficial in increasing mobility and general well-being, decreasing falls, and improving gait and bone mineral density (Guyonnet et al. 2015).

Falls prevention education using a booklet is one of the strategies to disseminate information to older adults. The usage of printed material can enhance a discussion about a topic in nutrition education program (Buller et al. 2000). This education tool has been used previously in patients with hypertension (Sampaio et al. 2016), as prevention for mild cognitive impairment (Johari et al. 2014) and to disseminate information regarding nutrition and physical activity (Burke et al. 2008) among older adults. In Malaysia, the usage of booklet as nutrition education tools has been developed as part of the intervention for metabolic syndrome among older adults (Shahar et al. 2013) and for obese children (Ruzita et al. 2013). The approach seems to be useful for various communities in Malaysia. However, based on literature search and market survey, there was still a paucity in education material available for fall prevention. Thus, in our present study, we aimed to implement booklet as an education tools for falls prevention by developing and evaluating a booklet that provides guidelines specifically on nutrition and prevention of falls among older adults. This booklet can be used as standardized guidelines for health professionals, care givers and older adults themselves for obtaining good nutrition for falls prevention.

MATERIALS AND METHODS

This cross-sectional study consisted of three phases has involved older adults aged 60 years and above around Kuala Lumpur. The data collection was perform using convenient sampling method at Sentul and Cheras older adults' activity center (PAWE), Hospital Kuala Lumpur, Titiwangsa Lake, Kampung Malaysia Tambahan and Chow Kit. Ethical clearance was obtained from UKM Ethical Committee prior to study (UKM 1.5.3.5/244/JEP-2016-020).

Phase I involved market and online survey to determine the available books on health targeted for older adults, need assessment on nutrition and falls knowledge of older adults and caregivers and finally the development of booklet. We visited a few bookstores and their websites to have an idea about topics that was less explored about nutrition and falls in older adults. A need assessment was conducted at Sentul older adults' activities center (PAWE) and Kampung Malaysia Tambahan involving 23 older

adults and seven caregivers to identify their prior knowledge on nutrition and falls prevention. The inclusion criteria for phase I included older adults and caregivers who were able to understand and write in Malay language. Respondents were excluded from study if they have cognitive problems, unable to read and write in Malay language, having physical disability and vision problems. A questionnaire modified from Nurul Atilia et al. (2015) was used to identify essential input to be included in the booklet. Further discussion, literature search and reference from various books and guidelines were adapted for the use in developing the booklet's content. Selected information was modified into pictures, illustrations, graphics, texts and figures as the content of the newly developed booklet. Information included in the booklet were adapted from the Atlas of Food Exchanges and Portion Sizes (Suzana et al. 2015), *Modul Latihan Pemakanan Warga Emas di Institusi* (Training module of nutrition for older adults in institutions) (Rohana & Hazizi 2013) and "Don't Fall for it: Falls can be prevented" (Commonwealth of Australia 2011). The development of a 32 pages A5 size booklet involved graphic designing, arrangement and editing using software including Microsoft Office and Adobe Photoshop (Figure 1). This booklet consist of topics on factors lead to fall and the effect of fall on older adults, information on bones, nutrition and exercise to prevent fall and tips to prevent fall. Each topics has its own objectives and learning outcomes (Table 1). This booklet is unique because we have combined both nutrition aspect and physical activities as part of falls prevention measures.

In phase II, content validation was conducted among six health professionals from various fields including nutrition, dietitian, biomedical sciences and occupational therapy. These health professionals were selected based on their involvement in research focusing on physical activity, nutrition and wellness. According to Lynn (1986), at least three individuals are needed for content validation. This process used TEMPtEd questionnaire (Clayton 2009) which consist of five criteria with different total score for each criteria including content (score 21), motivational principal (score 6), literature (score 12), graphic (score 9), and arrangement and typography (score 15). The total score for all criteria in TEMPtED questionnaire is 63. The results from validation process were used to improve and amend the content in order to disseminate reliable and easily understandable information to the public.

In phase III, the evaluation of acceptability of the booklet of nutrition and falls prevention among older adults. Sample size for phase III study was calculated using Cochrane (1977) formula. Standard deviation value from the study by Nurul Atilia et al. (2015) on booklet for stroke patient was included in the formula and the final sample size for phase III was 24 Questionnaires used for this phase was adapted from Siti Nur A'syura (2009) and Nur Nadia (2012) which consisted of information on socio-demographic, questions to evaluate the acceptance on the booklet and acceptance on information given in the booklet. Likert scale responses were used to evaluate respondents'' acceptance on understanding of the content, readability, graphic design and functions of the booklet as a nutritional educational material.

Prior to data collection, explanation on the study purpose was provided to the respondents and signed consent forms were obtained. Questionnaires were administered to the respondents and adequate time was given to complete the questionnaire. Throughout the completion of questionnaires, researchers were present to assist respondents with unclear questions. Sociodemographic data in phase III was compared between gender because of its influence on the health and mortality rate of older adults (Poston et al. 2008). In addition, previous study has suggested that there was a gender differences in mobility disability (Balogun & Guntupalli 206) which might affect the fall's risk. Normality was examined using Shapiro-wilk test. Data obtained were analyzed using SPSS version 22 for descriptive analysis. T-test was used to compare

TABLE 1. Table of content of the booklet

No.	Topic
1.	Introduction
2.	Why do we fall?
3.	Effects of fall on you
4.	Do you know?
5.	Eat healthy, less fall
6.	Make the wise choice!
7.	Let's move your body!
8.	Tips to reduce risk of fall
9.	Glossaries
10.	References

numerical data between gender and Chi square test was used to analyze the categorical data. Statistical significance was taken as $p<0.05$.

RESULTS

Table 2 shows the preference of 23 older adults and 7 caregivers for five topics to be included in the booklet from the need assessment (Phase I). Most of the respondents (more than 50 %) chose the score from 7 to 9 which referring to essential for all the subtopics listed. None of the respondents preferred score 0 and 1 to 3 which indicate "not essential" and "less essential" for all the subtopics listed.

Results for content validation (Phase II) by six health professionals from various fields are as shown in Table 3. The arrangement and typography of the booklet obtained the highest average total score (60%). The criterion with the lowest average total score was motivational principal (30.6%). Based on the comments and suggestions given by the health professionals, we have used words that were simple and easy to understand, applied infographic to reduce text and included practical example for healthy food choices to assist understanding,

Table 4 shows the demographic data of older adults who participated in the booklet evaluation (Phase III). The mean age of the respondents was 66.5 ± 4.8 years. Majority of the respondents were Malays (83.3%) and received formal education up to primary school (50%). Only 16.7% of the respondents were pensioners and majority of them had income less than RM1500 (58.3%). Furthermore, 70.8% older adults received monetary assistance especially from their children (88.2%) ($p<0.05$).

After the amendments in the booklet based on results from Phase II, we assessed the acceptance of the booklet among 24 older adults (Table 5). Based on the results, majority of the respondents (more than 40%) selected "good" for all the criteria except for pictures. No respondents chose "not satisfied" for all criteria except for content (8.3%). Additionally, the criteria with the highest percentage selected "very good" were for contents and pictures (12.5 %).

We have assessed the acceptability of the information included in the booklet in older adults. We included five subtopics namely the important nutrients to reduce risk of falls, how to obtain healthy bone, exercise for older adults, menu recommendation and food preference and also tips on falls prevention. Majority of the respondents (62.5%) stated that they were satisfied with the information provided in the booklet and 12.5% of the subjects chose "less satisfying". In addition, 25% of the respondents has chosen "very satisfying" for the information in the booklet.

DISCUSSION

In our current study, we determined the acceptability of a newly developed nutrition guidelines for falls prevention booklet among older adults. The same approach was used in another study for the development of an educational booklet to prevent mild cognitive impairment among older

TABLE 2. Subjects' preference on the subtopics to be included in the booklet (N=30) [N (%)]

Subtopics/ preference	Not essential (0)	Less essential (1-3)	Moderate Essential (4-6)	Essential (7-9)	Very essential (10)
Important nutrients to reduce risk of falls	-	-	3 (10.0)	22 (73.3)	5 (16.7)
How to obtain healthy bone	-	-	3 (10.0)	22 (73.3)	5 (16.7)
Easy exercise for older adults	-	-	8 (26.7)	17 (56.7)	5 (16.6)
Menu recommendation and food preference tips	-	-	4 (13.3)	25 (83.3)	1 (3.4)
Falls prevention tips	-	-	1 (3.3)	23 (76.7)	6 (20.0)

TABLE 3. Content validation by the experts (N=6) for each criteria (average total score and mean ± S.D)

Criteria Evaluated	Mean ± S.D (n=6)	Average total score (%)
Content	9.3 ± 4.5	45.2
Motivational principal	1.8 ± 1.6	30.6
Literature	6.5 ± 1.2	50.0
Arrangement and typography	8.5 ± 3.9	60.0
Graphic	4.3 ± 2.8	48.2
Total Score	30.5 ± 1.7	36.8

TABLE 4. Demographic data of elderly participated in the booklet's evaluation (Phase III) [n (%)]

Demographic data	Men (n=5)	Women (n=19)	All subjects (n=24)	P value
Age (years)				
Mean age (mean □ s.d)	64.8 ± 5.8	66.9 ± 4.7	66.5 ± 4.8	
60-65	3 (12.5)	8(33.4)	11 (45.8)	0.195
>65	2 (8.4)	11 (45.8)	13 (54.2)	
Race				
Malay	3(12.5)	17(70.8)	20 (83.3)	0.106
Chinese	1(4.2)	-	1 (4.2)	
Indian	1(4.2)	2(8.3)	3 (12.5)	
Education level				
No formal education	-	1(4.2)	1(4.2)	0.274
Primary school	1 (4.2)	11(45.8)	12 (50.0)	
Religious school	-	1(4.2)	1(4.2)	
Secondary school	4(16.7)	6(25.0)	10 (41.7)	
Working status				
Not working	2(8.3)	3 (12.5)	5(20.8)	0.252
Housewife	-	9 (37.5)	9(37.5)	
Pensioner	1(4.2)	3 (12.5)	4(16.7)	
Working	2(8.3)	4 (16.7)	6(25.0)	
Household income				0.791
None	1(4.2)	6(25.0)	7(29.2)	
<RM1500	3(12.5)	11(45.8)	14(58.3)	
RM1500-RM3999	1(4.2)	2(8.3)	3(12.5)	
Received monetary assistance				
Yes	2(8.3)	15(62.5)	17(70.8)	0.126
No	3(12.5)	4(16.7)	7(29.2)	
Source of monetary assistance				
Children	1(4.2)	14(86.7)	15(88.2)	0.023*
Welfare aid	1(4.2)	-	1(5.9)	
Others	-	1 (4.2)	1(5.9)	

*$p<0.05$, Chi-square test

TABLE 5. Acceptance of booklet by older adults (N=24) for all criteria (%)

Criteria	Not satisfied (%)	Less satisfied (%)	Satisfied (%)	Good (%)	Very good (%)
Content	8.3	-	37.5	41.7	12.5
Picture	-	4.2	45.8	41.7	8.3
Table and figure	-	8.3	33.3	50.0	8.3
Writing	-	8.3	33.3	54.2	4.2
Colour	-	4.2	33.3	54.2	8.3
Picture arrangement	-	8.3	37.5	41.7	12.5
Content arrangement	-	-	37.5	54.2	8.3
Language	-	4.2	33.3	54.2	8.3

FIGURE 1. The front page and some of the booklet's content

adults (Johari et al. 2011). For Phase I, majority of the respondents agreed that all suggested subtopics asked during needs assessment survey were essential to be included in the development of the contents in the booklet.

Apart from information adapted from the references, we have added information on nutrient requirement specifically for older adults such as calcium, protein and vitamin D. Furthermore, we have also included information on how to select healthy foods, examples of healthy menus and comparison between low and high calorie foods. In the development of printed health educational material, interaction between text and graphic need to be considered (Doak et al. 1996; Hoffmann & Worrall 2004). The illustration used in the booklets should be easily understandable by the readers (Houts et al. 2006). Therefore, we have incorporated both short sentences and pictures to facilitate readers' understanding on the content.

For phase II, majority of the panels from health professionals agreed that arrangement and typography was the best criteria in the booklet. Previous study has also emphasized the importance of the arrangement of content, flow of ideas, typography, space and type of paper in the booklet's development (Serxner 2000). Specifically, the arrangement of the illustrations and text are important to facilitate the understanding of the contents in older adults (Sampaio et al. 2016). In addition, review by the expert in the field are important to ensure the dissemination of accurate information to the target group (Guillot & Keenan 2016). Motivational principal was scored the lowest among the criteria for the booklet. According to Merritt et al. (1993), motivational dimension that focus on accepted behavior as a sign of action or changes form the reader should be included in printed educational media. In addition, the motivation element is important to encourage learning process (de Oliveira et al. 2014). Based on this opinion and comments, several changes were made to improve the contents in the booklet.

Previous study in Thailand has focused on improving gait and balance of the older adults as part of the fall prevention (Piphatvanitcha et al. 2007). A booklet produced in Hong Kong in Chinese language has included various information such as risk of fall, personal care, selection of clothing and exercise for fall prevention (EHS 2016). In addition, another booklet in English language has focused on home modification as part of falls prevention strategy (AOTA 2014). The newly developed booklet on nutrition education for falls prevention is unique because it combined topics on fall, importance of nutrition on bone health, suitable exercise to improve balance and muscle strength and also tips to prevent falls.

For phase III, majority of the respondents chose "good" for acceptability of the booklet in terms of contents, tables and figures, writing, color, picture arrangement, content arrangement and language. Contradictory finding was reported by (Shahar et al. 2012) where majority of older adults did not understand the contents in the booklet because of the terminology, followed by illustrations and nutrition recommendations. This is probably because our present booklet contents were made as simple as possible for layman. For acceptability of booklet in terms of information provided, most of the older adults chose "satisfied" and this finding was in line with the study by Shahar et al. (2012). Participation of the older adults and caregivers in the development of education material are very important. This step enables the targeted population to share their needs, thus assist in the improvement of booklet's content that can suit their demand (de Oliveira et al. 2014).

Overall, our study findings highlighted the acceptability of nutrition related falls prevention booklet among older adults in Malay language. The several limitations in our study include the absent of content validation among older adults and limited number of Chinese and Indian respondents. Thus, our study results may not be applicable

to our multiracial population in general. However, this study can be a starting point for further development of education tools specifically to advocate knowledge on falls prevention among Malaysian older adults. To widen the reader of the booklet, this education material can be converted into e-content and disseminated through social media and website.

CONCLUSION

In conclusion, majority of the older adults were satisfied with the newly developed booklet contents on nutrition and falls prevention. Thus, this booklet is suitable to be used among older adults as an educational package in educating older adults in nutritional intake and prevention of falls. Future studies should consider the development of such educational booklets in multi languages including English, Mandarin and Tamil to increase the acceptance of the booklet among the multiracial Malaysian older adults and also to disseminate such valuable information through social media and internet for a wider outreach among the communities.

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