
PUBLIC HEALTH RESEARCH

Practice of Dietary Supplements and its Influence towards Treatment Adherence among Chronic Disease Patients

Safurah Khairul Fadzil¹, Marhanis Salihah Omar¹ and Noorlaili Mohd Tohit²

¹Faculty of Pharmacy, Universiti Kebangsaan Malaysia, Jalan Raja Muda Abdul Aziz, 50300 Kuala Lumpur, Malaysia.

²Department of Family Medicine, Faculty of Medicine, Universiti Kebangsaan Malaysia, Jalan Yaacob Latif, Bandar Tun Razak, 56000 Kuala Lumpur, Malaysia.

*For reprint and all correspondence: Marhanis Salihah Omar, Faculty of Pharmacy, Universiti Kebangsaan Malaysia Jalan Raja Muda Abdul Aziz 50300 Kuala Lumpur.

ABSTRACT

Received	14 March 2018
Accepted	9 July 2018

Introduction The use of dietary supplements had risen over the years among chronic disease patients with most of it were of patients' own initiative. This study aimed to describe the supplements use, assess the knowledge and attitude towards supplements and its interaction with prescribed medication, and determine whether knowledge and attitude towards supplements could influence treatment adherence in chronic disease patients.

Methods A cross-sectional study was conducted among chronic disease patients in Universiti Kebangsaan Malaysia Medical Center, Kuala Lumpur from September to November 2016 upon their written informed consent. This study consists of a collection of validated instruments that measured the use of dietary supplements and its reason; the knowledge and attitude on dietary supplements and supplements-drug interaction and medication adherence.

Results A total number of 250 respondents were interviewed and 72.4% was found to use supplements of own initiatives. Most of the respondents were using supplements to maintain health (78.8%), prevent health problems (72.4%) and improve overall health (63.2%). It was found that respondents' knowledge on supplement-drug interactions were not at the satisfactory level. The treatment adherence was found not to be associated with knowledge and attitude towards supplements nor numbers of supplements use.

Conclusions Chronic disease patients mainly knew on the purpose of supplements for health and wellness, but had less knowledge on supplement-drug interactions, warranting patients' education on that particular field.

Keywords Supplement - Chronic disease - Knowledge - Attitude - Adherence.

INTRODUCTION

Majority of the dietary supplements are regarded as a natural mode of healing and easy to get, fairly inexpensive and 'natural' substances; claimed to be able to improve or prevent many diseases¹. It is found that dietary supplements intake had risen in the annual prevalence over the years². Dietary supplements are perceived to be safe, however the efficacy and cost-effectiveness are still studied. The use of dietary supplements had been strengthened as there had been reports on the association of dietary supplements and chronic diseases³. Supplements were reported to prevent advanced age-related macular degeneration only in high-risk individuals⁴. Thus, people who are more health conscious may use more dietary supplements compared to the non-users⁵.

It is estimated that chronic diseases such as cardiovascular diseases and cancers cause up to 35 million deaths worldwide⁶. Diabetes, end-stage renal disease and osteoarthritis are also becoming significant public health problems. Patients with chronic diseases are often prescribed with multiple drugs, leading to higher chances of drug-drug interactions, adverse drug events, hospitalization and death⁷. Healthcare practitioners may also be unaware that patients are taking dietary supplements together with prescription drugs and other over-the-counter medications. Hence, it may also be important to ask patients to bring along all medications and dietary supplements they are consuming when visiting healthcare professionals⁸.

It is known that patients usually take dietary supplements on their own initiative or with advice from a close relative of medically-unrelated background^{9,10}. Although there are rising concern on supplements-drug interactions, only a small number of patients perceived that it is important to inform physicians or pharmacists regarding dietary supplements use¹¹. Most patients believed that dietary supplements are meant to be safe¹². In contrast, more than half of the patients with chronic diseases deemed to underuse the prescribed medications, leading to medication adherence problems¹³. The risk on non-adherence are further accentuated with the bigger number of chronic disease patients who are taking dietary supplements along with their prescribed medications¹⁴. Some patients could not differentiate the pharmacological differences between prescribed medications and dietary supplements⁴. It may lead to misleading reasons for the use of supplements and can affect the treatment adherence. Thus, this study aimed to describe dietary supplements use among chronic disease patients, to assess the knowledge and attitude towards the use of dietary supplements and its interaction with prescribed medication as well as to identify whether dietary supplements use could influence treatment adherence in patients with chronic diseases.

METHODS

A cross-sectional study was conducted among patients with chronic diseases in Universiti Kebangsaan Malaysia Medical Center, Cheras Kuala Lumpur from 1 September to 31 November 2016 upon their written informed consent. Study participants were recruited using convenience sampling. They were required to be at least 18 years old, treated for at least one chronic disease, was taking supplements and was able to understand either English or Malay Language. Those who failed to complete the questionnaire would be excluded from the study. This study was approved by UKM Human Research Ethics Committee. This study consists of a collection of validated instruments that measured the use of dietary supplements and its reason; the knowledge and attitude on dietary supplements and supplements-drug interaction and medication adherence. The use of dietary supplements and its reason was used collect detailed information on the patients' use of dietary supplements over the past 30 days¹⁵. The knowledge and attitude on dietary supplements and supplement-drug interactions questionnaire was used to assess the knowledge and attitude on dietary supplements and supplement-drug interactions¹⁶. The scores of the five questions were then summed and assessed for the knowledge and attitude score of the patients. Higher scores indicate better knowledge and attitudes on dietary supplements. Meanwhile, the adherence to refill medication scale (ARMS) questionnaire¹⁷ was used to assess the treatment adherence of the patients. The score for each item was summed to assess the treatment adherence of the patients and lower scores indicated better adherence.

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) version 22 (IBM Corp, Armonk, NY). The demographic information of the respondents obtained from the questionnaires was analysed using descriptive analysis. Descriptive analysis was also used to describe the use of dietary supplements among the respondents, reasons of using dietary supplements and willingness to continue assumptions as well as knowledge and attitude towards dietary supplements and supplement-drug interactions. Chi-Square test was used to determine the association between demographic factors and the number of dietary supplements used. Mann Whitney U test was used to determine the association between the number of dietary supplements used and treatment adherence. Spearman's rho correlation was used to determine the association between the knowledge and attitude towards dietary supplements with treatment adherence. Any p-value less than 0.05 was considered as a statistically significant.

Dietary supplements among chronic disease patients

RESULTS

There were a total number of 250 respondents involved in this study (Table 1). Most of the respondents were in the age range of 41 to 60 (n=103, 41.2%) and 61 to 80 years old (n=118, 47.2%). More than half of the respondents perceived their health status to be good and preferred to consume combinations of dietary supplements. Majority of them were taking dietary supplements for more than five times in a week (n=175, 70.0%). In this study, all of the

respondents were taking medications that require prescriptions due to their chronic diseases and almost all of the respondents used dietary supplements in the past 30 days prior the recruitment. It was found that majority of the respondents consumed the dietary supplements based on their own decision (n=181, 72.4%) without any recommendation by their health care professionals. There appeared to be a significant association between gender and the number of dietary supplements taken ($\chi^2=6.119$, $p=0.013$).

Table 1 Socio-demographics characteristics of the respondents (N=250)

Characteristic	Total respondents (n, %)	Number of supplements use		Mean \pm SD	p-value
		Single	Combinations		
Gender					
Male	135 (54.0)	54	81		0.013
Female	115 (46.0)	29	86		
Age (years)					
21-40	24 (9.6)	12	12	58.96 \pm 12.113	0.157
41-60	103 (41.2)	31	72		
61-80	118 (47.2)	37	81		
More than 80	5 (2.0)	3	2		
Race					
Malay	153 (61.2)	53	100		0.831
Chinese	71 (28.4)	22	49		
Indian	26 (10.4)	8	18		
Number of diagnosis					
One	80 (32.0)	30	50	2.24 \pm 1.231	0.125
Two	77 (30.8)	27	50		
Three	64 (25.6)	21	43		
Four	17 (6.8)	3	14		
Five	11 (4.4)	1	10		
More than five	1 (0.4)	1	0		
Number of medications taken					
One to two	86 (34.4)	25	61	2.22 \pm 1.207	0.740
Three to four	80 (32.0)	31	49		
Five to six	44 (17.6)	15	29		
Seven to eight	23 (9.2)	7	16		
More than eight	17 (6.8)	5	12		
Duration of disease (years)					
1 - <5	77 (30.8)	27	50		0.081
5 - 10	66 (26.4)	28	38		
>10	107 (42.8)	28	79		
Number of dietary supplements currently taking					
Single	83 (33.2)				
Combinations	167 (66.8)				
Frequency of dietary supplements use					
More than 5 times/week	175 (70.0)				
2-5 times/week	33 (13.2)				
Less than 5 times/week	20 (8.0)				
Periodically over the year	22 (8.8)				

“To maintain health”, “to prevent health problems” and “to improve health” were the three most common reasons behind the use of dietary supplements among chronic diseases patients (Table 2). Majority of them agreed that they had

benefited from taking the supplements and were affirmed to be in favour of future assumptions of dietary supplements used. A majority of the respondents considered taking dietary supplements essential for their health (n=196, 78.4%). Only half

of the respondents thought that the amount of minerals, vitamins and other substances that they get from daily food intake were enough (n=130, 52.0%). For the fifth question, three quarter of the respondents were firm to their understanding of

right dietary supplements (n=188, 75.2%). Most of the respondents agreed that the labels on the dietary supplements helped them to understand better (n=176, 70.4%).

Table 2 Reasons for the use of dietary supplements among respondents (N=250)

Reason	Total respondents (n, %)
For skin health	12 (4.8)
For bowel conditions	15 (6.0)
To improve overall health	158 (63.2)
To prevent health problem	181 (72.4)
To supplement the diet	19 (7.6)
To maintain health	197 (78.8)
For anaemia (low iron)	2 (0.8)
For healthy joints (prevent arthritis)	38 (15.2)
For heart health	43 (17.2)
For menopause	5 (2.0)
To boost immunity	59 (23.6)
For muscle-related issues	6 (2.4)
For bone health	65 (26.0)
For enhanced energy	69 (27.6)
For eye health	7 (2.8)
Other reason	74 (29.6)
For weight loss	8 (3.2)

Most of the respondents had total knowledge and attitude score on dietary supplements of 15 to 19 score (n=140, 56.0%) out of 25 score with mean score of 17.62 ± 2.974 . They also agreed that herbal products and dietary supplements could be useful in treating certain medical conditions and/or promote health and wellness (Table 3). More than a quarter of the respondents disagreed that herbal products and

dietary supplements may cause harmful side effects. About one third of the respondents disagreed that herbal products and dietary supplements can interact with other supplements or medications. For the fourth question, majority of the respondents felt comfortable in discussing the use of herbal products and dietary supplements with their doctors or pharmacists.

Table 3 Knowledge and attitude on dietary supplements (N=250)

Questions	Respondents' answers (N=250) (n, %)					Mean score \pm SD
	Strongly disagree (score: 1)	Disagree (score: 2)	Neutral (score: 3)	Agree (score: 4)	Strongly agree (score: 5)	
1. Herbal products and dietary supplements can be useful for treating certain medical conditions and/or promote health and wellness.	4 (1.6)	15 (6.0)	39 (15.6)	99 (39.6)	93 (37.2)	4.05 \pm 0.956
2. Herbal products and dietary supplements can have harmful side effects.	34 (13.6)	76 (30.4)	67 (26.8)	61 (24.4)	12 (4.8)	2.76 \pm 1.111
3. Herbal products and dietary supplements can interact with other supplements or medications.	21 (8.4)	68 (27.2)	65 (26.0)	65 (26.0)	31 (12.4)	3.07 \pm 1.168
4. I feel comfortable discussing my use of herbal products and dietary supplements with my doctor or health care provider.	8 (3.2)	26 (10.4)	19 (7.6)	97 (38.8)	100 (4.0)	4.02 \pm 1.088
5. I feel comfortable discussing my use of herbal products and dietary supplements with my pharmacist.	13 (5.2)	42 (16.8)	29 (11.6)	82 (32.8)	84 (33.6)	3.73 \pm 1.235

Dietary supplements among chronic disease patients

For the knowledge on supplement-drug interactions, nearly half of the respondents did not know that drug dosage may affect supplements-drug interactions and they also agreed that health status may affect supplement-drug interactions in some way. Nearly half of the respondents had not been informed about supplements-drugs interactions (n=148, 44.2%). They mainly obtained the supplements-drugs interactions related information from the internet or close friends and relatives who had used the supplements or drug. Only 13.7% of the respondent had gotten the

information from the doctors, making pharmacists the least source of information with 9.0% of the respondents. Despite the high medication adherence (16.15 ±3.451 out of 48 scores), there was no significant association between the number of dietary supplements used and adherence level towards prescribed medication (p=0.525) (Table 4). In this study, it was also found that the knowledge and attitude of dietary supplements did not associate with the adherence level towards prescribed medications (p=0.771).

Table 4 Treatment adherence using ARMS-Scale questionnaire (N=250)

No	Question	Answer (n, %)			
		None (Score: 1)	Sometimes (Score: 2)	Most of the time (Score: 3)	All of the time (Score: 4)
1	How often do you forget to take your medicine?	94 (37.6)	127 (50.8)	29 (11.6)	0 (0.0)
2	How often do you decide not to take your medicine?	176 (70.4)	45 (18.0)	13 (5.2)	16 (6.4)
3	How often do you forget to get prescriptions filled?	195 (78.0)	44 (17.6)	11 (4.4)	0 (0.0)
4	How often do you run out of medicine?	190 (76.0)	52 (20.8)	7 (2.8)	1 (0.4)
5	How often do you skip a dose of you medicine before you go to the doctor?	201 (80.4)	44 (17.6)	1 (0.4)	4 (1.6)
6	How often do you miss taking your medicine when you feel better?	207 (82.8)	22 (8.8)	9 (3.6)	12 (4.8)
7	How often do you miss taking your medicine when you feel sick?	242 (96.8)	7 (2.8)	1 (0.4)	0 (0.0)
8	How often do you miss taking your medicine when you are careless?	147 (58.8)	86 (34.4)	17 (6.8)	0 (0.0)
9	How often do you change the dose of your medicines to suit your needs (like when you take more or less pill than you're supposed to)?	185 (74.0)	43 (17.2)	12 (4.8)	10 (4.0)
10	How often do you forget to take your medicine when you are supposed to take it more than once a day?	146 (58.4)	89 (35.6)	13 (5.2)	2 (0.8)
11	How often do you put off refilling your medicines because they cost too much money?	230 (92.0)	15 (6.0)	2 (0.8)	3 (1.2)
12	How often do you plan ahead and refill your medicines before they run out?	(Score:4) 14 (5.6)	(Score:3) 5 (2.0)	(Score:2) 42 (16.8)	(Score:1) 189 (75.6)

DISCUSSION

Millions of people are using dietary supplements together with their prescribed drugs and over-the-counter medications. It was found in our study that most patients consumed the dietary supplements without seeking for healthcare practitioners' advice as they tended to believe that dietary supplements may promote their general health and wellness. With the rise of the internet use nowadays for the

promotion of immune systems, cardiovascular health and arthritis conditions, health conscious people would be easily influence by the advertisements on the internet on dietary supplements for general health maintenance¹⁸⁻²⁰. Many patients also used dietary supplements for prophylaxis and palliative purposes⁶. However, although the internet worked conveniently, it may had omitted important information on the safety

including the potential adverse effects and supplement-drug interactions²¹. Most patients also perceived the dietary supplement to be safe and efficacious as a natural product were not supposed to bring in any harmful effects^{19,20}.

Combinations of dietary supplements were preferable compared to a single dietary supplement. This was due to the reason that patients were taking them to treat various diseases, each for a different reason. Another reason would be that combinations of supplements could give synergistic effect to the patients. For example, it was found that when using vitamin E and C supplements together with non-steroidal anti-inflammatory drugs, less cognitive decline and lower risk of Alzheimer's disease was shown²². Women tended to use calcium supplements for bone health. Studies had suggested that combination of vitamin D and calcium could increase the absorption of calcium into the body²³ thus making combination of these supplements preferable.

More than half of the respondents believed that they benefited from the supplements taken and affirmed to be in favour of future assumption. They also considered dietary supplements to be essential and were confident that the supplements were right for them. For example, for those who are using products deemed for osteoarthritis, it was claimed that their pain level was greatly reduced and subsequently increased their quality of life. Most patients agreed that labels on dietary supplements helped them to understand more about the products. Though most of the respondents were older adults, they claimed that if they were unable to read the labels, the family members would help to explain the labels for them. The labels were perceived as the most accurate source of information for the products as it came directly from the manufacturer. Hence the patients would trust them more compared to the internet which covers more on general information aspects. It was also found that majority of the respondents agreed that they either 'usually' trust the labels or 'always' trust the labels of non-prescription medications and dietary supplements²⁰. Therefore, for preventive measure, it would always be good to ask the patient whether they understand the labels on the products.

It was found that respondents' knowledge on supplement-drug interactions were not at the satisfactory level. Most of the patients knew that they were required to take supplements and prescribed medications at different time to avoid any possible interactions. Most of the dietary supplements bought for personal use come from retail pharmacy or unauthorized seller in which supplement-drug interactions might not be explained to the patients. This finding differs with a previous study¹² where majority of the respondents knew of the factors that may affect supplement-drug interactions. This result suggests that although

most patients knew that dietary supplements can promote health and wellness, they had little knowledge on the supplements-drug interactions and the factors affecting them.

In this study, more than half of the respondents indicated that they were comfortable in discussing their use of dietary supplements with the physicians or pharmacists. However, most of them were unaware that they needed to inform the healthcare practitioners on the dietary supplements used. Previous studies had yield similar results and found that respondents perceived that it is essential to be honest with healthcare providers about the use of dietary supplements due to the risk of interactions^{20,24} indicating that patients had developed a big trust and comfort with the healthcare practitioners. This is very favourable and reinforces the need for healthcare practitioners to assess the use of dietary supplements in patients before starting a treatment.

Polypharmacy had been commonly practiced in managing patient's chronic diseases. In our study, it was found that the number of supplements taken did not affect patients' treatment adherence. The knowledge and attitude towards dietary supplement also did not affect patients' treatment adherence. These observations may be due to the good practice of healthcare professionals to always emphasize on adherence towards medications to the patients. These differ from previous studies where patients had been non-adhering to the medications in favour of the supplements taken²⁵. This result suggests that although patients had high levels of treatment adherence, it would be beneficial to remind them on the differences of dietary supplements and medications as to ensure that they do not skip any medications for dietary supplements.

CONCLUSION

Patients mainly knew the purpose of dietary supplements which were for health and wellness, but had less knowledge on their side effects and supplement-drug interactions. Thus, healthcare practitioners need to emphasize more on patients' education on the field. Further researches can be done to compare between supplements user and non-supplements user and its association to treatment adherence among patients.

REFERENCES

1. Ashar BH, Rowland-Seymour A. Advising Patients Who Use Dietary Supplements. *Am J Med.* 2018;121(2): 91-97.
2. Kelly JP, Kaufman DW, Kelley K, Rosenberg L, Anderson TE, Mitchell AA. Recent Trends in Use of Herbal and Other Natural Products. *Arch Intern Med.* 2005; 165(3): 281-286.

Dietary supplements among chronic disease patients

3. Ye Z, Song H. Antioxidant Vitamins Intake and the Risk of Coronary Heart Disease: Meta-Analysis of Cohort Studies. *Eur J Prev Cardiol.* 2008;15(1): 26-34.
4. Timbo BB, Ross MP, Mccarthy PV, Lin, CTJ. Multivitamin/mineral supplements and prevention of chronic disease. *Evid Rep Technol Assess.* 2006; 139:1-117.
5. Stupay S, Sivertsen L. Herbal and Nutritional Supplement Use in the Elderly. *Nurse Pract.* 2002;25(9): 56-67.
6. Huang HY, Caballero B, Chang S, Alberg AJ, Semba RD, Schneyer C, Wilson RF, Cheng TY, Prokopowicz G, Barnes GJ. Multivitamin/Mineral Supplements and Prevention of Chronic Disease: Executive Summary. *Am J Clin Nutr.* 2007; 85(1): 265S-268S.
7. Field TS, Gurwitz JH, Harrold LR, Rothschild J, Debellis KR, Seger AC, Auger JC, Garber LA, Cadoret C, Fish LS. Risk Factors for Adverse Drug Events among Older Adults in the Ambulatory Setting. *J Am Geriatr Soc.* 2004; 52(8): 1349-1354.
8. Wold RS, Lopez ST, Yau CL, Butler LM, Pareo-Tubbeh SL, Waters DL, Garry PJ, Baumgartner RN. Increasing Trends in Elderly Persons' Use of Nonvitamin, Nonmineral Dietary Supplements and Concurrent Use of Medications. *J Am Diet Assoc.* 2005; 105(1): 54-63.
9. Ambrose ET, Samuels S. Perception and Use of Herbals among Students and Their Practitioners in a University Setting. *J Am Acad Nurse Pract.* 2004; 16(4): 166-173.
10. Yilmaz MB, Yontar OC, Turgut OO, Yilmaz A, Yalta K, Gul M, Tandogan I. Herbals in Cardiovascular Practice: Are Physicians Neglecting Anything? *International Journal of Cardiology.* 2007; 122(1): 48-51.
11. Samojlik I, Mijatović V, Gavarić N, Krstin S, Božin B. Consumers' Attitude Towards the Use and Safety of Herbal Medicines and Herbal Dietary Supplements in Serbia. *Int J Clin Pharm.* 2013; 35(5): 835-840.
12. Bebeçi E, Papajani V, Risto J. Knowledge and Awareness of Nutritional Supplements and Drug Interactions and the Role of Pharmacist in the Prevention. *Age.* 2015; 18(24): 35.
13. Steinman MA, Landefeld C, Rosenthal GE, Berthenthal D, Sen S, Kaboli PJ. Polypharmacy and Prescribing Quality in Older People. *J Am Geriatr Soc.* 2006; 54(10): 1516-1523.
14. Maraldi C, Lattanzio F, Onder G, Gallerani M, Bustacchini S, De Tommaso G, Volpato S. Variability in the Prescription of Cardiovascular Medications in Older Patients. *Drugs Aging.* 2009; 26(1): 41-51.
15. Bailey RL, Gahche JJ, Miller PE, Thomas PR, Dwyer JT. Why Us Adults Use Dietary Supplements. *JAMA Intern Med.* 2013;173(5): 355-361.
16. Owens C, Toone T, Steed-Ivie M. A Survey of Dietary Supplement Knowledge, Attitudes, and Use in a Rural Population. *J Nutr Food Sci* 2014; 4:304.
17. Kripalani S, Risser J, Gatti ME, Jacobson TA. Development and Evaluation of the Adherence to Refills and Medications Scale (ARMS) among Low-Literacy Patients with Chronic Disease. *Value Health.* 2009; 12(1): 118-123.
18. Gardiner P, Graham R, Legedza AT, Ahn AC. Factors Associated with Herbal Therapy Use by Adults in the United States. *Altern Ther Health Med.* 2007; 13(2): 22.
19. Marinac JS, Buchinger CL, Godfrey LA, Wooten JM, Sun C, Willsie SK. Herbal Products and Dietary Supplements: A Survey of Use, Attitudes, and Knowledge among Older Adults. *J Am Osteopath Assoc.* 2007; 107(1): 13-23.
20. Axon DR, Vanova J, Edel C, Slack M. Dietary Supplement Use, Knowledge, and Perceptions Among Student Pharmacists. *Am J Pharm Educ.* 2017;81(5):92.
21. Morris CA, Avorn J. Internet Marketing of Herbal Products. *JAMA.* 2003; 290(11): 1505-1509.
22. Fotuhi M, Zandi PP, Hayden KM, Khachaturian AS, Szekely CA, Wengreen H, Munger RG, Norton MC, Tschanz JT, Lyketsos CG. Better Cognitive Performance in Elderly Taking Antioxidant Vitamins E and C Supplements in Combination with Nonsteroidal Anti-Inflammatory Drugs: The Cache County Study. *Alzheimers Dement.* 2008;4(3): 223-227.
23. Lappe JM, Travers-Gustafson D, Davies KM, Recker RR, Heaney RP. Vitamin D and Calcium Supplementation Reduces Cancer Risk: Results of a Randomized Trial. *Am J Clin Nutr.* 2007; 85(6): 1586-1591.
24. Klein JD, Wilson KM, Sesselberg TS, Gray NJ, Yussman S, West J. Adolescents' Knowledge of and Beliefs About Herbs and Dietary Supplements: A Qualitative Study. *J Adolesc Health.* 2005; 37(5): 409.
25. Archer SL. Nonvitamin and Nonmineral Supplement Use among

Elderly People. J Am Diet Assoc.
2005;105(1):63-64.