

# Factors Associated to Dietary Supplement Consumption Behavior among Undergraduate Students in the Central Part of Thailand; A Cross-sectional Study

Phannathat Tanthanapanyakorn<sup>1</sup>, Sasiwimol Chanmalee<sup>1</sup>, Naphatsaran Roekruangrit<sup>1</sup>

<sup>1</sup>Faculty of Public Health, Valaya Alongkorn Rajabhat University under the Royal Patronage, Pathum Thani, Thailand, 13180

Email address: phannathat.tan @ vru.ac.th.com, sasiwimol.chan @ vru.ac.th, nj\_nunew @ hotmail.com

**Abstract**— The dietary supplement is a good short cut solution to get adequate amounts of essential nutrients and better quality of health. The aim of this study was to investigate the associated factors of dietary supplement consumption behavior among undergraduate students in the central part of Thailand. This study was a cross-sectional study surveying 218 undergraduate students aged 18-24 years old in the university between June and October 2019 by multi-stage random sampling. The data were collected using the structured interview and medical record consisted of 4 parts. Data were analyzed by using descriptive statistics and Pearson correlation coefficient. The result showed that the majority samples had a high level of dietary supplement consumption behavior (55.5%), followed by moderate and low level of and dietary supplement consumption behavior (43.6% and 0.9%, respectively). Moreover, the result revealed that the factors which remained significantly associated with dietary supplement consumption behavior were monthly income ( $r = 0.133$ ,  $p = 0.049$ ), attitude about dietary supplement consumption ( $r = 0.291$ ,  $p < 0.001$ ) and social support ( $r = 0.309$ ,  $p < 0.001$ ). The finding suggests that the university administrators in the central part of Thailand should focus on associated factors to plan and impose a policy or guidance for changing the appropriate behavior of dietary supplement in the students.

**Keywords**— Behavior, Dietary Supplement, Social Support.

## I. INTRODUCTION

The dietary supplement is a good short cut solution to get adequate amounts of essential nutrients and better quality of health [1]. Most of people who living in big urban areas having a hectic lifestyle. They are facing to variety factors to make them have a rush life and unhealthy behaviors such as late-night sleep, early wake up and eating unhealthy food [2]. Moreover, the majority of people concern of the benefits to their health. For example, having carbohydrate in the morning to provide energy, increasing the muscle and repair cell by having protein, vitamins and minerals able to help for metabolism process, etc. Regarding as rushing life are mentioned above the nutrition for food per each meal might not be enough, there is a chance that they will become malnutrition [3]. Form human lifestyle especially, the busy life may lead to having no time to cook and having nutritious foods, also, unhealthy diet able to make the people lack of expenditure of necessary vitamins and minerals with these unhealthy behaviors are to lead people to risk in poor health

when they used the in-sufficient of dietary supplement consumption [4]. The survey of National Statistical Office of Thailand showed that 86% of people during 25 – 59 years old populations had completed three meals a day [5].

The results of unhealthy affect to body system [6] such as gastrointestinal, cardiovascular, central nervous system, etc. also, appearance which may affects to dry skin, wrinkles and exhaustion. A number of people who are spending their fast lifestyle and start to have unhealthy or feeling tired might seeking some solutions. They are come to trust that in order to affect unhealthy by taking dietary supplement.

The dietary supplement was included vitamins, dietary or herb supplement. It is an accessible solution for a people who had a hectic lifestyle, especially in Bangkok Metropolis and Vicinity. The people who not rather gradually concern deteriorating health conditions and certainly they need to get treated by doctor [7]. Accordingly, buying and consuming dietary supplement are turn to be a part of healthy lifestyle people. Many pharmaceutical companies are concern regarding dietary supplement market and launch variety product as direct result for each requirement of consumer to increasing the intent of consumer behavior.

Regarding to the related literature review, there factor which affecting the decided to purchase food or dietary supplements. According to J., Koontawee et al. [8] whose study the factors related to dietary supplement behavior consumption among undergraduate university students, in the northern Thailand. The result showed that the majority of samples had higher consumption of dietary supplements (58.6%). The factors associated with the consumption habits of dietary supplements were found to be revenue, attitude and influence from mass communication on consumption of dietary supplements. Moreover, N., Chotthitaporn [9] whose study the factors affecting to purchasing decision on dietary supplement products. The finding reported that age, level of health behavior, knowledge, attitude and marketing were associated to dietary supplement behavior.

Results of this research can be used as the basis for the planning to educate and promote the proper of dietary supplements or to provide behavioral modification activities. This study was applied the PRECEED-PROCEED Model to explore the factors related to dietary supplement consumption

behavior [10]. The objective in this study was to investigate the level of the dietary supplement consumption behavior and determine the relationship between the predisposing factors, reinforcing factors and enabling factors with the supplement consumption behavior among undergraduate students in the central part of Thailand.

## II. METHOD

The study was a cross-sectional study to investigate the level of the dietary supplement consumption behaviour and determine the relationship between the predisposing factors, reinforcing factors and enabling factors with the supplement consumption behaviour among undergraduate students in the central part of Thailand. The population was the undergraduate student who were located on the university from the central part of Thailand and the subjects were recruited by multi-stage random sampling based on the inclusion criteria. The subjects included 218 undergraduate students and the study period was during June to October 2019.

### A. Participants

The population in this study was the undergraduate students who were aged range between 18-24 years old and registered on academic year 2019. The participants of this study were recruited by using the multi-stage random sampling. A sample size of this study was calculated based on analysis of Daniel equation [11]. Thus, the sample size used for this study was 218 cases. The data were collected using the structured interview and medical record. The inclusion criteria in this study were the samples of both men and women who were located at the university from the central part of Thailand. Moreover, they had good level of consciousness and could communicate, or to be assessed with all tests. The sample was participated in the interview and data collection in the study by voluntary. The researcher and co-researcher were informed the participants about the study protocol and the risk after they participated with the study and they signed a written consent form.

### B. Instruments

The instruments of this study were an interview and medical record which consisted of 4 parts. The research was developed the instrument from the PRECEED-PROCEED Model and the literature review related with the dietary supplement consumption behaviour. The instrument was used the structural interview form by face to face interview with the social distancing for preventing the Coronavirus-19 distribution. The program was measured the validity by peer from 3 experts on health behavior and reported the IOC value. The IOC value was ranged between 0.8-1.0. The reliability was tested in 30 undergraduate students in the same area as the study area whose characteristics were similar to those of the participants. The reliability of Cronbach's alpha coefficients was more than 0.90, it was acceptable of tool. The detail of the instrument can describe as follows:

*Part I: The general characteristics questionnaire:* The total of this part was 6 questions. This part was to record the general characteristics data such as gender, age, grade,

monthly income, congenital disease and dietary supplement advertisement.

*Part II: The knowledge of dietary supplement assessment form;* The total of this part was 9 questions. Each question has 2 choices; "yes" or "no". When answer "yes" in a positive question, the score 1 was given, while score 0 was given in the answer "no". On the other hand, when answer "yes" in a negative question, a score 0 was given, while 1 score was given in the answer "no". The score ranged from 0-9 points. The scores were rated in 3 level based on Bloom [12] as follows; the scores less than 5.4 points represented low level of dietary supplement knowledge, scores 5.5-7.2 points represented moderate level of dietary supplement knowledge, and 7.3-9.0 points represented high level of dietary supplement knowledge.

*Part III: The attitude of dietary supplement assessment form;* The total of this part was 9 questions. This part was the closed-ended question. Each question has 4 choices; "definitely agree." or "agree" "disagree." Or "definitely disagree". When answer "definitely agree" in a positive question, the score 4 was given, while score 3 was given in the answer "agree", score 2 was given in the answer "disagree" and score 1 was given in the answer "definitely disagree". On the other hand, in a negative question, a score was indirectly given. The scores were rated in 3 level based on Best [13] as follows; the scores mean score 1.00-2.00 represented low level of dietary supplement attitude, mean score 2.01-3.00 represented moderate level of dietary supplement attitude, and mean score 3.01-4.00 points represented high level of dietary supplement attitude.

*Part IV: The accessibility of dietary supplement questionnaire;* The total of this part was to 4 questions. Each question has 4 answers choices: "definitely agree." or "agree" "disagree." Or "definitely disagree". When answer "definitely agree" in a positive question, the score 4 was given, while score 3 was given in the answer "agree", score 2 was given in the answer "disagree" and score 1 was given in the answer "definitely disagree". On the other hand, in a negative question, a score was indirectly given. The scores were rated in 3 level based on Best [13] as follows; the scores mean score 1.00-2.00 represented low level of dietary supplement accessibility, mean score 2.01-3.00 represented moderate level of dietary supplement accessibility, and mean score 3.01-4.00 points represented high level of dietary supplement accessibility.

*Part V: The use of dietary supplement in their family and society questionnaire;* The total of this part was to 2 questions. Each question has 4 answers choices: "definitely agree." or "agree" "disagree." Or "definitely disagree". When answer "definitely agree" in a positive question, the score 4 was given, while score 3 was given in the answer "agree", score 2 was given in the answer "disagree" and score 1 was given in the answer "definitely disagree". On the other hand, in a negative question, a score was indirectly given. The scores were rated in 3 level based on Best [13] as follows; the scores mean score 1.00-2.00 represented low level of dietary supplement in their family and society, mean score 2.01-3.00 represented moderate level of dietary supplement in their

family and society, and mean score 3.01-4.00 points represented high level of dietary supplement in their family and society.

**Part VI: The social support assessment form;** The total of this part was to 9 questions. Each question has 5 answers choices: “always” or “often” or “sometime” or “rarely” or “never”. The positive questions were given the score range from 5-1 and the negative questions were indirectly given the score. The scores were rated in 3 level based on Best [13] as follows; the mean score 1.00-2.33 represented low level of social support, mean score 2.34-3.66 represented moderate level of social support, and mean score 3.67-5.00 points represented high level of social support.

**Part VII: The dietary supplement consumption behavior assessment form;** The total of this part was to 7 questions. Each question has 5 answers choices: “always” or “often” or “sometime” or “rarely” or “never”. The positive questions were given the score range from 5-1 and the negative questions were indirectly given the score. The scores were rated in 3 level based on Best [13] as follows; the mean score 1.00-2.33 represented low level of dietary supplement consumption behavior, mean score 2.34-3.66 represented moderate level of dietary supplement consumption behavior and mean score 3.67-5.00 points represented high level of dietary supplement consumption behavior.

**C. Ethical Consideration**

This study was approved by the Ethics Review Committee for Research Involving Human Research Subjects. The researcher and co-research were informed the participants about the study protocol and the risk of the intervention program before they signed a written consent form.

**D. Data collection**

The data collection was performed as follows:

1.) The researcher was requested an introduction letter from the Faculty of Public Health, Valaya Rajabhat University, Thailand to send to the President of university from the central part of Thailand, to explain the objectives of this study and asked for permission to collect data. After the President of the university was approved the research, the researcher started to perform the procedure.

2.) The researcher and co-researcher were trained to use the instrument in this study to evaluate in all of factors and outcome parameter before collecting data.

3.) The researchers and co-researcher were collected data by meeting the subject and introducing themselves, to explain the study objectives and ask for participation in this study. The subjects were explained that they could refuse or withdraw from the study at any time. When the subjects clearly understood the procedure, they were asked to sign the informed consent form. Then, the researchers started to collect data.

4.) The researcher collected data from the undergraduate students from the university. The data were collected by interview such as general information, factor related to the dietary supplement and behaviour. For questionnaire, the data collection time was approximately 30 minutes per subject.

5.) After the samples were completely answered the questionnaires, the researcher checked the completeness and thanked them for cooperation. Then, recheck before analyzing data by statistical methods.

**E. Statistical analysis**

The descriptive statistics were used to explore the general characteristics and level of dietary supplement. The relationship between the predisposing factors, reinforcing factors and enabling factors with the supplement consumption behaviour among undergraduate students in the central part of Thailand were analysed by Pearson correlation coefficient. The significant level of this study was defined at 0.05.

**III. RESULT**

A total of 218 undergraduate students who were participants and assessed the tool in this study. The general characteristics showed in table I. The results showed that a total of all participants was 20.14± 1.20 years old with an average of monthly income was 4,730.28±1,463.8 Bath. The participants were female more than male (90.4%). The majority of the samples were studied at 3<sup>rd</sup> year and received the dietary supplement advertisement by Facebook. They mostly had no diseases (98.2%).

TABLE I. The number and percentage of subject by general characteristics (n=218)

General Characteristic Variables	Number	Percentage
<b>Age (years)</b>		
Mean± SD. = 20.14±1.20		
<b>Education Year</b>		
1 <sup>st</sup> year	53	24.3
2 <sup>nd</sup> year	52	23.9
3 <sup>rd</sup> year	62	28.4
4 <sup>th</sup> year	51	23.4
<b>Gender</b>		
Male	21	9.6
Female	197	90.4
<b>Monthly Income</b>		
< 5,000 Thai Bath	164	75.2
< 5,001-10,000 Thai Bath	54	24.8
Mean± SD.=4,730.28±1,463.8		
<b>Congenital Diseases</b>		
Yes	4	1.8
No	214	98.2
<b>Dietary Supplement Advertisement*</b>		
Facebook	173	79.4
Television	105	48.2
Line Application	55	25.2
Leaflets, Posters, Billboards	38	17.4

\* One subject might have more one choice

From the study of 218 undergraduate students from the central part of Thailand, the structural-interview form was used for evaluating the all of factors and outcome variable. It was found that the score of the knowledge about dietary supplement ranged from 5-9 with mean of 8.06 (SD. = 1.02). By the defined score rate point of the knowledge, the highest proportion had high level of knowledge on dietary supplement (68.8%), followed by moderate and low level of knowledge on dietary supplement (30.3% and 0.9%, respectively). The mean of the attitude about dietary supplement was at 2.66 (SD. = 0.42). By the defined mean score rate of the attitude, the highest proportion had moderate level of attitude on dietary



supplement (74.8%), followed by high and low level of attitude on dietary supplement (15.6% and 9.6%, respectively). The mean of the accessibility of dietary supplement was at 3.23 (SD. = 0.39). By the defined mean score rate of the accessibility, the highest proportion had high level of accessibility on dietary supplement (55.5%), followed by moderate and low level of accessibility on dietary supplement (43.6% and 0.9%, respectively).

TABLE II. The number and percentage of subject by the level of factors related to dietary supplement consumption (n= 218)

Variables	Number	Percentage
<b>Knowledge about dietary supplement</b>		
Low	2	0.9
Moderate	66	30.3
High	150	68.8
Mean± SD.=8.06±1.02		
<b>Attitude about dietary supplement</b>		
Low	21	9.6
Moderate	163	74.8
High	34	15.6
Mean± SD.=2.66±0.42		
<b>Accessibility of dietary supplement</b>		
Low	2	0.9
Moderate	95	43.6
High	121	55.5
Mean± SD.=3.23±0.39		
<b>Family used of dietary supplement</b>		
Low	13	6.0
Moderate	169	77.5
High	36	16.5
Mean± SD.=3.00±0.40		
<b>Social support</b>		
Low	20	9.3
Moderate	191	87.4
High	7	3.3
Mean± SD.=2.87±0.39, Range= 15-40		
<b>Dietary supplement behavior</b>		
Low	11	5.0
Moderate	78	35.8
High	129	59.2
Mean± SD.=3.73±0.81, Range= 14-35		

Moreover, the mean of the family used of dietary supplement was at 3.00 (SD. = 0.40). By the defined mean score rate of the family used of dietary supplement, the highest proportion had moderate level of family used of dietary supplement (77.5%), followed by high and low level of accessibility on dietary supplement (16.5% and 6.0%, respectively). The mean of the social support was at 2.87 (SD. = 0.39). By the defined mean score rate of the social support, the highest proportion had moderate level of social support (87.4%), followed by low and high level of social support (9.3% and 3.3%, respectively). The mean of the dietary supplement consumption behavior was at 3.73 (SD. = 0.81). By the defined mean score rate of the behavior, the highest proportion had high level of dietary supplement consumption behavior (59.2%), followed by moderate and low level of dietary supplement consumption behavior (35.8% and 5.0%, respectively).

According to the data analysis of association between all factors and dietary supplement consumption behavior, it was found that monthly income (r = 0.133, p= 0.049), attitude about dietary supplement consumption (r = 0.291, p< 0.001) and social support (r = 0.309, p< 0.001) was significantly

associated with dietary supplement consumption behavior among undergraduate students from the central part of Thailand.

TABLE III. The analysis of factors associated with dietary supplement consumption behavior among undergraduate students in the central part of Thailand by using the Pearson correlation coefficient multiple. (n= 218)

Variables	r	p-value
Age	0.044	0.515
Monthly income	0.133	<b>0.049*</b>
Knowledge about dietary supplement	0.023	0.731
Attitude about dietary supplement	0.291	<b>&lt;0.001*</b>
Accessibility of dietary supplement	0.096	0.158
Family used of dietary supplement	-0.074	0.280
Social support	0.309	<b>&lt;0.001*</b>

REMARK: Data were analyzed with Pearson correlation coefficient

\*Statistically significant at the 0.05 level p-value<0.05.

#### IV. DISCUSSION

The study design was the cross-sectional study. They mostly had had the high level of dietary supplement consumption behavior (55.5%), According to the factor related with dietary supplement consumption behavior were monthly income, attitude and social support. The result is consistent with the study of N.A.S.A, Aziz1 and N.H., Kamarulzaman [14] whose study the factors influencing consumers' behavior towards dietary supplements. The finding showed that norms, awareness, attitude and perceived behavior control were the factors that influenced consumers' behavior towards dietary supplements. Similarly, with A., Pannin [15] whose study food supplement consumption behavior of bachelor's degree students. The result reported that marketing communication and brand values effected to the decision of buying the supplementary food products. And, marketing communication effected to the decision of buying the supplementary food of the students at bachelor degree level. Moreover, C., Sritoomma and B., Muktabhant [16] whose study dietary supplement consumption behavior of Bachelor's Degree students. The subjects were 334 bachelor's degree students from 6 faculties at KhonKaen University. The result showed that positive attitude was associated with dietary supplement consumption behavior (adjusted OR=5.29, 95% CI=1.55-17.98, p-value<0.01).

The results may be explained that firstly, monthly income was related to dietary supplement consumption, it can may be explained that income is influencing with behavioral level of dietary supplement consumption. When the participants have increased income, the dietary supplement consumption will be increased. On the other hand, when the participants have decreased income, the dietary supplement consumption will be decreased. In addition, advertising media for today is diverting and influencing with students' perceptions and decision thinking that effected to dietary supplement consumption behavior along with the economic status. Secondly, the attitude is crucial factor and influenced to the dietary supplement consumption behavior. The good attitude is affecting to promote the level of dietary supplement consumption. Nowadays, the people are aware of their health and improve the self-care. So, if they have the choice to help for avoiding illness or alleviate illness by using the dietary supplement. Moreover, some people were believed that intake

the dietary supplement can help to keep healthy and indicate for treatment, prevent the diseases, and slow down aging or help them look better. As a result, there is an increasing in the consumption of dietary supplements, especially in adolescents whose lifestyles change and they were considered with the beauty as important. Furthermore, social support has reflected that receiving advice, reminders, and counseling from family, friends, and teachers are affecting to the consumption behavior of dietary supplements.

#### V. LIMITATION AND RECOMMENDATIONS

There was limitation in this study, it was explained that the study design was a cross-sectional study which could not tell the cause-effect relationship. Although the cross-sectional design was appropriate for this study in terms of shorter time of investigation the relationship between factors and outcome variable and low cost, it did not allow interpretation of the finding further than the association between variables of interest. The factors and outcomes were measured simultaneously in the same period. The results of this study may not explain about the causal relationship between variable examined. Therefore, a cohort study or case-control design would be useful for future research so that more implication will be better justified. For the recommendation from this study, the university administrators can bring the factor related with the outcome to plan and impose a policy or guidance for changing the appropriate behavior of dietary supplement in the undergraduate students. The further studies should select the advance statistic for investigating the causal model to find the causal effect between the independent variables and the dependent variable in order to better understand the problem in participants who lived in the central part of Thailand. The mixed-method is the best design to understand the cause by using in-depth interviews or focus group for the qualitative part.

#### VI. CONCLUSION

The result showed that monthly income, attitude about dietary supplement consumption and social support were associated with dietary supplement consumption behavior. Also, the healthcare providers or the university administrative board should promote the proper attitude about the dietary supplement and support the advice clinic or health club which is a consultation center about the correct and proper use of dietary supplements and suitable for each student.

#### ACKNOWLEDGMENT

The authors are grateful to all participants for their willing participation in this study. We would like to give a special thanks to the President of University from the central part of Thailand for the generosity location to conduct the data collection.

#### REFERENCES

- [1] N., Kaur, D.P., Singh. "Deciphering the consumer behavior facets of functional foods: a literature review", *Appetite*, vol 112, pp. 167-187, 2017.
- [2] A., Dickinson, D., MacKay. "Health habits and other characteristics of dietary supplement users: a review". *Nutri J*, vol 13, issue 14, pp. 1-8, 2014.
- [3] C., Vinijchaiyanun, P., Vichitthamaros. "Factors affecting weight control dietary supplements consumption of people in Bangkok". *WMS Journal of Management, Walailak University*, vol 6, issue 1, pp. 84-90, 2017.
- [4] B., Phonchai. "A study of attitude and dietary supplement product consumption behavior among nursing student in Nakhon Phanom University". *FAD Journal*, vol 1, pp. 51-57, 2016.
- [5] Thai Health Promotion Foundation. *Thai are consuming "supplement" the most in the world*, 2019. Available from: <https://www.thaihealth.or.th/Content/12290-shorturl.at/dpKOP>.
- [6] H., Alfawaz, N., Khan, A., Alfaifi, et al. "Prevalence of dietary supplement use and associated factors among female college students in Saudi Arabia". *BMC Women's Health*, vol 17, pp.116, 2017.
- [7] E., Kobayashi, Y., Sato, K., Umegaki, et al. "The prevalence of dietary supplement use among college students: A nationwide survey in Japan". *Nutrients*, vol 9, issue 11, pp. 1–12, 2017.
- [8] J., Koontawe et al. "Factors related to dietary supplement behavior consumption: A case study of undergraduate university students, in the northern Thailand". *Public Health Policy & Laws Journal*, vol. 6, issue 1, pp. 109-125, 2020.
- [9] N., Chothitaporn. "Factors Affecting to Purchasing Decision on Dietary Supplement Products for Beauty Through Internet among Professional Nurses". *Thai Red Cross Nursing Journal*, vol. 12, issue 2, pp. 151-164, 2019.
- [10] L., Green, M., Kreuter M. "Health program planning: An educational and ecological approach." 4th edition. New York, NY: McGrawhill, 2005.
- [11] W.W., Daniel. "Biostatistics: a foundation for analysis in the health sciences". 5th ed. New York: John Wiley & Son, 2010.
- [12] B.S., Bloom. "Taxonomy of educational objectives: The classification of educational goals". New York, NY: Longmans, Green, 1956.
- [13] J., Best. "Research in Education". New Jersey: Prentice Hall, Inc.1977.
- [14] N.A.S.A, Azizi and N.H., Kamarulzaman. "Factors Influencing Consumers' Behaviour Towards Fraudulent Dietary Supplements". *Malays J Agric Econ*, vol 29, issue 1, pp. 1-21, 2020.
- [15] A., Pannin. "Food Supplement Consumption Behavior of Bachelor's degree students of Business Administration Faculty Bangkokthomburi University". Master Degree of Arts, Department of Organizational Administration, Faculty of Liberal Arts, Krirk University, 2018.
- [16] C., Sritoomma, B., Muktabhant. "Dietary Supplement Consumption Behaviour of Bachelor's Degree Students in Social Sciences, Khon Kaen University". *KKU Journal for Public Health Research*, vol. 8, issue 4, pp. 6-13, 2015.