

# Development of a Questionnaire to Evaluate Knowledge and Attitude of Obesity and Weight Loss in Thai Overweight/Obese Medical Students: The Pilot Study

Pongsakorn Buraphat, M.D., Pattarawalai Talungchit, M.D., Ph.D.\*, Suthirat Ratanarojanakul, M.D., Supasaek Virojanapa, M.D., Thitiporn Sirivunnabood, M.D., Chunanuch Kaewsomnuk, M.D., Thitimun Vorathongchai, M.D., TheeradejTepkasetkul, M.D., Suwis Charoenwisetsin, M.D., Pongkasem Wintakorn, M.D., Papawee Chennavasin, M.D., Nipat Nipatphonsakun, M.D., Bhurichaya Deelerthaweesap, M.D., Amphaphan Norrasunthron, M.D., Thakoon Chairsisook, M.D., Jutipat Manomaivibul, M.D., Saran Krithin, M.D., Ranida Thamphithak, M.D., Nicha Vetvitayavatana, M.D., Suppavich Kieattisaksopon, M.D., Chanin Wasuthalainun, M.D., Mayuree Homsanit, M.D., Ph.D.\*\*

\*Siriraj Health Policy Unit. \*\*Department of Preventive and Social Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.

## ABSTRACT

**Background:** Medical students who will grow up as physicians will be role models for patients in health behaviors. However, some medical students are still overweight or obese. A weight reduction program can both decrease weight and change attitude about obesity and losing weight. Unfortunately, there is no validated questionnaire to measure knowledge and attitude about obesity and weight loss for our medical students.

**Objective:** To develop a questionnaire for evaluation of knowledge and attitude toward obesity and weight loss in Thai overweight/obese medical students.

**Methods:** We developed the questionnaire using Health Belief Model under consultation of two experts in obesity, biostatistics and epidemiology. Validity of the questionnaire was evaluated by the index of item-objective congruence under supervision of five experts. This pilot study was performed to test the internal consistency and reliability using Cronbach's alpha coefficient. Twenty-seven medical students who self-reported as overweight or obese were included in this study.

**Results:** A fifty-seven items questionnaire using five-point Likert scale was developed with the index of item-objective congruence of all items in presented questionnaire more than 60%. Cronbach's alpha coefficients of all domains were in the range of 0.74-0.90 and overall standardized Cronbach's coefficient of the questionnaire was 0.87. The average inter-item correlation of each domain was in acceptable range (0.21-0.62) although; those of the total scale were 0.12.

**Conclusion:** Validity and reliability of this questionnaire were acceptable to be used for assessment of knowledge and attitude of obesity and losing weight in Thai overweight or obese medical students.

**Keywords:** Overweight; obesity; questionnaire; health belief model; medical student

Siriraj Med J 2016;68:323-331

E-journal: <https://www.tci-thaijo.org/index.php/sirirajmedj>

doi:10.14456/smj.2016.20

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Correspondence to: Pattarawalai Talungchit

E-mail: [pattarawalai.tal@mahidol.ac.th](mailto:pattarawalai.tal@mahidol.ac.th)

Received 2 November 2015

Revised 10 August 2016

Accepted 25 August 2016

## INTRODUCTION

Overweight and obesity are the major public health problems which are also considered as important risk factors for non-communicable diseases such as diabetes, hypertension, coronary artery disease and cerebro-vascular disease.<sup>1</sup> In 2014, the leading cause of mortality (71%) in Thai population was non-communicable diseases.<sup>2</sup> A study by the Institute of Nutrition, Mahidol University revealed that 40.9% of Thai populations older than 19 years were overweight or obese.<sup>3</sup> This may have resulted from transition of social and economic backgrounds in several past decades which have caused changes in health-related behaviors in Thai population.<sup>4,5</sup>

Physicians who are one important unit of the health care system have responsibility to delivery medical care including prevention and treatment. However, physicians and medical students, who should be good role models in health-related issues, have also been affected by a worldwide obesity epidemic.<sup>6-9</sup> Physicians' body weight affects both physicians' confidence in obesity-related counseling and affects medical practice which is related with obesity.<sup>10,11</sup> In Thailand, this problem also has great magnitude, and a study demonstrated that 16.8% of medical students are overweight or obese.<sup>6</sup> Moreover, 1.04% of the second year Thai medical students in one institute met the criteria of metabolic syndrome.<sup>7</sup>

Weight reduction is one of the hard-to-solve problems in medicine. Obesity is a multifactorial condition in which environmental factors are also included in pathogenesis.<sup>12</sup> Many social and psychological models have been proposed to explain how intrapersonal aspects also impact body weight. Health Belief Model is a socio-psychological model for health behaviors decision making.<sup>16</sup> Previous studies, which assessed participants in a weight management program, using the model demonstrated the important role of intrapersonal aspects - knowledge and attitude-toward obesity.<sup>14-16</sup> Therefore, baseline knowledge and attitude is essential for development of effective intervention to reduce weight among overweight/obese medical students.

Several studies have reported on knowledge and attitude regarding obesity in medical students,

physicians and other health care providers.<sup>14,17-19</sup> However, they may not reflect the knowledge and attitude of Thai medical students with different social contexts, cultures and behaviors. Thus, we performed this pilot study to develop a questionnaire measuring knowledge and attitude toward obesity in Thai overweight/obese medical students.

## MATERIALS AND METHODS

This study was conducted at the Faculty of Medicine Siriraj Hospital, Mahidol University from December 1 to 30, 2014 after the study protocol was approved by Siriraj Institutional Research Board; EC645/2557 (EC4) Si.653/2014.

Firstly, the Health Belief Model which comprises of 7 domains: knowledge (Baseline knowledge in related-topics), perceived seriousness (Belief about severity and consequences of problems), perceived susceptibility (Belief about personal risks of problems), perceived benefit (Belief about benefits if they change behaviors), perceived barrier impedances (Belief about obstacles which prevent them to change behaviors), cues to losing weight (Things which encourage their actions), and self-efficacy (Belief that they can make the changes) was used to develop the items in the first draft questionnaire.

Secondly, a total of 63 five-point Likert scale items were designed using "totally disagree", "disagree", "no comment", "agree" and "totally agree" for one to five points, respectively. These questions, originally developed in Thai language, were categorized for seven domains as 15 items for knowledge, 7 items for perceived seriousness, 5 items for perceived susceptibility, 10 items for perceived benefit of losing weight, 15 items for perceived barrier impedances, 5 items for cues to losing weight, and 6 items for self-efficacy. Moreover, there were four short-essay questions to assess opinion in perceived benefit, cues, inspirations, and self-efficacy for losing weight. All items of the questionnaire were reviewed, revised and edited by two experts in obesity, biostatistics and epidemiology. After that, the questionnaire was double-translated to English by a native speaker. The detail of 63 items was presented in the last column of Table 1.

**TABLE 1.** Detail of IOC for each original questionnaire item.

Item	Answer for each expert (-1, 0, 1)*					IOC (%)	
	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5		
q1	- 1	1	1	1	1	1	60.00
q2	1	1	1	1	1	1	100.00
q3	1	1	1	1	1	1	100.00
q4	1	1	1	0	1	1	80.00
q5	1	1	1	0	1	1	80.00
q6	1	1	1	0	1	1	80.00
q7	1	1	1	0	1	1	80.00
q8	1	1	1	0	1	1	80.00
q9	1	1	0	1	1	1	80.00
q10	1	1	1	1	1	1	100.00
q11	1	1	1	1	1	1	100.00
q12	1	1	1	1	1	1	100.00
q13	1	1	0	1	1	1	80.00
q14	1	1	1	1	1	1	100.00
q15	1	1	0	1	1	1	80.00
q16	1	0	1	0	1	1	60.00
q17	1	0	1	0	1	1	60.00
q18	1	0	0	1	1	1	60.00
q19	1	0	- 1	1	1	1	40.00
q20	1	0	1	1	1	1	80.00
q21	1	0	1	1	1	1	80.00
q22	1	1	- 1	0	1	1	40.00
q23	1	0	1	1	1	1	80.00
q24	1	0	1	1	1	1	80.00
q25	1	1	1	1	1	1	100.00
q26	1	0	1	1	1	1	80.00
q27	1	0	1	1	1	1	80.00
q28	1	0	1	1	1	1	80.00
q29	- 1	0	1	1	1	1	40.00
q30	1	0	1	1	1	1	80.00
q31	- 1	0	1	1	1	1	40.00
q32	- 1	0	1	1	1	1	40.00
q33	1	0	1	1	1	1	80.00
q34	1	0	1	1	1	1	80.00
q35	1	- 1	1	1	1	1	60.00
q36	1	0	1	1	1	1	80.00
q37	1	1	1	1	1	1	100.00
q38	1	0	1	1	1	1	80.00
q39	1	0	1	1	1	1	80.00
q40	1	0	1	1	1	1	80.00
q41	1	- 1	1	1	1	1	60.00
q42	1	0	1	1	1	1	80.00
q43	1	0	1	1	1	1	80.00
q44	1	- 1	1	1	1	1	60.00

**TABLE 1.** Detail of IOC for each original questionnaire item.

Item	Answer for each expert (-1, 0, 1)*					IOC (%)	
	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5		
q45	1	- 1	1	1	1	1	60.00
q46	1	0	1	1	1	1	80.00
q47	1	0	1	1	1	1	80.00
q48	1	- 1	1	1	1	1	60.00
q49	1	- 1	1	1	1	1	60.00
q50	1	0	1	1	1	1	80.00
q51	1	0	1	1	1	1	80.00
q52	1	0	1	1	1	1	80.00
q53	1	1	1	1	1	1	100.00
q54	1	1	1	1	1	1	100.00
q55	1	0	1	1	1	1	80.00
q56	1	0	1	1	1	1	80.00
q57	1	0	1	1	1	1	80.00
q58	1	0	1	1	1	1	80.00
q69	1	0	1	1	1	1	80.00
q60	1	0	1	1	1	1	80.00
q61	1	- 1	1	1	1	1	60.00
q62	1	- 1	1	1	1	1	60.00
q63	1	0	1	1	1	1	80.00

\* '-1', '0' and '1' designed as 'totally invalid', 'no comment' and 'totally valid'

Validity of the questionnaire was evaluated by an index of item-objective congruence (IOC) under supervision of five experts in obesity, nutrition, biostatistics, psychiatric evaluation and health promotion who did not participate in developing the questionnaire. An IOC of each questionnaire item was calculated. The experts were asked to rate score for each item from '-1', '0' and '1' designed as 'totally invalid', 'no comment' and 'totally valid'. An acceptable level of IOC was equal to or more than 60.00%. Five items (q. 19, 22, 29 31, 32 in Table 1) which received IOC < 60.00% were excluded from the questionnaire.

Reliability of this questionnaire was tested among Thai overweight/obese medical students. The sample size was calculated from Cochran (1963:75) equation (20), which determined  $\alpha = 0.05$ , level of precision = 15% and prevalence of overweight and obesity in medical students = 16.8% from the previous study.<sup>6</sup> The sample size of overweight/obese medical students was 23 persons.

The developed questionnaires were printed on paper and delivered to 400 medical students regardless of their body mass index (BMI) using stratified sampling (100 students per academic years, 2<sup>th</sup>-5<sup>th</sup> years). One hundred and forty-six questionnaires were returned without response from 4th year medical student. Only 27 from those 146 medical students with body mass index (BMI) met the criteria of overweight or obesity for Asian population (BMI  $\geq 23$  or  $\geq 25$  kg/m<sup>2</sup>, respectively) and were included in this pilot study.<sup>6</sup>

Internal consistency and reliability was assessed in which Cronbach's alpha coefficient was applied. For all analyses, statistical significance was taken at p < 0.05 level. Parametric-free tests including median, interquartile range (IQR), proportion, percent, and ratio were applied to our data. All statistical results were computed using SPSS version 18.0.0.

**TABLE 2.** Demographic data of participants.

Parameters	Male:Female ratio	Median	25 <sup>th</sup> to 75 <sup>th</sup> percentile
<b>N = 27, n (%)</b>			
<b>Academic year</b>			
2 <sup>nd</sup> year, 9 (33.3)	5:4		
3 <sup>rd</sup> year, 8 (29.6)	7:1	N/A	N/A
5 <sup>rd</sup> year, 10 (37)	10:0		
<b>Body weight (kg)</b>			
All, 27 (100)	22:5	75.00	71.50 to 78.50
Overweight, 12 (44.4)	8:4	70.5	66.75 to 74.7
Obesity, 15 (55.6)	14:1	78.00	74.50 to 81.85
<b>BMI (kg/m<sup>2</sup>)</b>			
All, 27 (100)	22:5	25.30	23.50 to 27.10
Overweight, 12 (44.4)	8:4	24.43	23.16 to 24.11
Obesity, 15 (55.6)	14:1	26.99	25.80 to 28.83

## RESULTS

After validity testing, a total of 58 items questionnaire were processed for reliability test. A reliability study among 27 overweight/obese Thai medical students with the characteristics as described in Table 2 was done. Only 5 out of 27 medical students were female and overweight/obesity ratio was 4/5.

Results of reliability test with percentage of agreement for each item were shown in Table 3. Although, Cronbach's coefficient of questionnaire was rising when some items with low corrected item-total correlation were removed, it showed marginal difference. After discussion with the experts, we decided to keep these items.

Furthermore, analysis of internal consistency for each domain was performed as shown in Table 4. Both un- standardized and standardized alpha coefficients ranged from 0.74- 0.92, except the domain of "Perceived susceptibility" (0.56/ 0.55). Our analysis demonstrated that if q25 was removed, the coefficient of the domain would increase to 0.74. Therefore, we decided to remove this item from the questionnaire. Therefore the final questionnaire consisted of 57 items with 4 open-ended questions at the end. Percentage of agreement showed that self-efficacy in losing weight was less than 50% for all items. Examination with time constraint for study and delicious food were identified as important barriers for

losing weight. Knowledge about food exchange was still needed among the medical students.

Subgroup analysis was conducted using sex, academic year and overweight/obese status. Data were shown as Table 5. All subgroups except female obtained Standardized Cronbach's coefficient more than 0.8.

## DISCUSSION

This study was a pilot study to develop a self-reported, multi-dimensional questionnaire for medical students to evaluate knowledge and attitude toward overweight/ obesity using the health belief model. After a validity and reliability process, the final questionnaire consisted of 57 items which obtained moderate to high reliability. Similar to previous study, our developed questionnaire composed of questions about nutrition and physical activity knowledge as well as obesity-related complications.<sup>21-22</sup> Measurement of attitude which was specific for our target group and culture as mentioned in previous studies was considered.<sup>23-24</sup>

In validity testing process, most of the removed items (4/5) were about obesity-related health issues. The experts explained that by their age, participants were not likely to suffer from obesity- related health problems. This opinion was consistent with the low percentage of agreement on q47 (health problems make me lose weight). Although the medical students still did not suffer

**TABLE 3.** Results of reliability test with percentage of agreement for each item.

Item	Participant who answer in possible answers (n=27)					Median (IQR)	% of agreement** (%)	Cronbach's Alpha if Item Deleted*	Corrected Item-Total Correlation
	1	2	3	4	5				
<b>Knowledge</b>									
Q1	4	4	11	4	4	3 (4,2)	30	0.89	0.30
Q2	0	1	0	11	15	5 (5,4)	96	0.88	0.50
Q3	0	1	0	7	19	5 (5,4)	96	0.87	0.70
Q4	0	1	1	10	15	5 (5,4)	93	0.86	0.85
Q5	0	1	1	9	16	5 (5,4)	93	0.86	0.82
Q6	0	0	2	11	14	5 (5,4)	93	0.87	0.78
Q7	0	1	1	11	14	5 (5,4)	93	0.86	0.84
Q8	0	1	1	10	15	5 (5,4)	93	0.86	0.85
Q9	0	2	6	11	8	4 (5,3)	70	0.88	0.42
Q10	0	0	8	10	9	4 (5,3)	70	0.90	-0.04
Q11	0	0	2	6	19	5 (5,4)	93	0.88	0.50
Q12	0	7	8	9	3	3 (4,2)	44	0.88	0.48
Q13	0	2	4	10	11	4 (5,4)	78	0.87	0.67
Q14	0	1	7	10	9	4 (5,3)	70	0.88	0.53
Q15	0	0	1	7	19	5 (5,4)	96	0.88	0.39
Q16	0	0	3	14	10	4 (5,4)	89	0.85	0.62
Q17	0	0	4	13	10	4 (5,4)	85	0.86	0.59
Q18	1	2	4	11	9	4 (5,3)	74	0.80	0.81
Q19	1	2	6	12	6	4 (4,3)	67	0.81	0.75
Q20	0	4	3	10	10	4 (5,3)	74	0.83	0.70
Q21	2	1	9	13	2	4 (4,3)	56	0.73	0.45
Q22	0	2	1	18	6	4 (4,4)	89	0.68	0.58
Q23	0	4	3	13	7	4 (5,3)	74	0.69	0.54
Q24	1	1	4	11	10	4 (5,4)	78	0.64	0.61
Q25	0	0	1	10	16	5 (5,4)	96	0.89	0.77
Q26	4	1	7	5	10	4 (5,3)	56	0.91	0.64
Q27	0	1	6	11	9	4 (5,3)	74	0.91	0.51
Q28	0	2	4	10	11	4 (5,4)	78	0.87	0.84
Q29	0	1	8	9	9	4 (5,3)	67	0.87	0.81
Q30	0	0	4	11	12	4 (5,4)	85	0.88	0.83
Q31	0	2	4	9	12	4 (5,4)	78	0.87	0.84
Q32	1	7	12	5	2	3 (4,2)	26	0.80	0.28
Q33	10	6	4	7	0	2 (4,1)	26	0.78	0.60
Q34	4	8	7	7	1	3 (4,2)	30	0.80	0.32
Q35	0	1	4	9	13	4 (5,4)	81	0.80	0.29
Q36	5	7	8	5	2	3 (4,2)	26	0.79	0.39
Q37	1	2	3	17	4	4 (4,4)	78	0.79	0.43
Q38	2	2	8	10	5	4 (4,3)	56	0.77	0.67
Q39	3	9	6	5	4	3 (4,2)	33	0.79	0.44
Q40	7	14	3	2	1	2 (2,1)	11	0.80	0.36
Q41	6	10	6	5	0	2 (3,2)	19	0.79	0.49
Q42	1	0	4	11	11	4 (5,4)	81	0.79	0.42

**TABLE 3.** Results of reliability test with percentage of agreement for each item.

Item	Participant who answer in possible answers (n=27)					Median (IQR)	% of agreement** (%)	Cronbach's Alpha if Item Deleted*	Corrected Item-Total Correlation
	1	2	3	4	5				
Knowledge									
Q43	3	4	4	14	2	4 (4,2)	59	0.77	0.67
Q44	1	3	6	8	9	4 (5,3)	63	0.81	0.16
Q45	1	3	3	8	12	4 (5,3)	74	0.81	0.20
Q46	0	10	10	5	2	3 (4,2)	26	0.79	0.49
Q47	2	7	8	6	4	3 (4,2)	37	0.72	0.46
Q48	1	3	6	11	6	4 (4,3)	63	0.70	0.50
Q49	5	11	5	4	2	2 (3,2)	22	0.70	0.52
Q50	2	1	6	13	5	4 (4,3)	67	0.75	0.37
Q51	2	3	5	11	6	4 (4,3)	63	0.62	0.71
Q52	1	3	11	9	3	3 (4,3)	44	0.00	0.35
Q53	0	5	12	6	4	3 (4,3)	37	0.73	0.56
Q54	1	4	12	7	3	3 (4,3)	37	0.68	0.73
Q55	1	7	12	5	2	3 (4,2)	26	0.70	0.67
Q56	3	9	10	3	2	3 (3,2)	16	0.80	0.30
Q57	1	1	13	7	5	3 (4,3)	44	0.73	0.56

\* Cronbach's alpha if item deleted was calculated within each domain, \*\* % of agreement: percentage of participant give score 4 or 5 in each item.

**TABLE 4.** Cronbach's coefficients of seven domains of the 57 and 58 item-questionnaire.

Domain	Cronbach's coefficient / Based on Standardized Items	Average inter-item correlation	Range of inter-item correlation	Percentage of pair of items that receive inter-item correlation 0.30 – 0.70
Overall questionnaire (57)	0.87 / 0.89	0.12	1.68	23.06
(58)*	0.87 / 0.88	0.11	1.68	22.51
Knowledge (15)	0.88 / 0.90	0.37	1.24	44.76
Perceived seriousness (5)	0.86 / 0.87	0.57	0.39	70.00
Perceived susceptibility (4)	0.74 / 0.75	0.43	0.58	16.78
(5)**	0.56 / 0.55	0.20	1.79	10.00
Perceived benefit (7)	0.90 / 0.92	0.62	0.59	57.14
Perceived barrier (15)	0.80 / 0.80	0.21	1.18	37.14
Cues to losing weight (5)	0.75 / 0.74	0.37	0.52	70.00
Self-efficacy (10)	0.77 / 0.78	0.37	0.76	66.67

\*Cronbach's coefficients of seven domains of the 58 item-questionnaire, \*\*Cronbach's coefficients of Perceived susceptibility domain of the 58 item-questionnaire

from health problems related to obesity, this perception also had negative effect toward readiness to lose weight.<sup>21</sup>

Generally, Cronbach's coefficients of overall questionnaire and in every domain were

very high (0.74-0.90). We can conclude that internal consistency of our questionnaire was acceptable, and each item has communality with the other items. Although the overall average inter-item correlation was low (0.12), each domain

**TABLE 5.** Subgroup analysis of overall questionnaire.

Subgroup, N= 27 (n)	Standardized Cronbach's coefficient
<b>Sex</b>	
Male (22)	0.90
Female (5)	0.26
<b>Academic Year</b>	
2 <sup>th</sup> (9)	0.85
3 <sup>th</sup> (8)	0.95
5 <sup>th</sup> (10)	0.80
<b>Weight Status</b>	
Overweight (12)	0.84
Obese (15)	0.90

received average inter-item correlation in acceptable range (0.21-0.62, as presented in Table 4). This may indicate that the items are measuring the same attribute in each domain. “Perceived Susceptibility” domain had low percentage of pair of items which received inter-item correlation 0.30-0.70 (16.78%) which could be explained by the different perception of individual image when subgroup analysis for the pair of items was done. Other subgroup analyses for gender, academic year, and weight status showed that standardized Cronbach’s coefficient in each subgroup was acceptable except in female. Nevertheless, female participants in this study were only five which also affected statistical power.

Responses from the participants as a pilot group showed some important issues; low self- efficacy with lack of knowledge about food exchange and stress from study as well as examination which might influence the possibility for losing weight. Similarly, previous study in stressful occupation revealed that self efficacy and knowledge were significantly related with BMI.<sup>22</sup> Therefore, proper intervention should be considered.

This is the first pilot study to develop the questionnaire accessing knowledge and attitude of obesity and losing weight in Thai overweight/ obese medical students. This questionnaire might be useful for further research to identify the proper intervention for successful weight loss in medical students.

However, our study has some limitations. The responder and recall bias might occur from

self- reported data on weight and height of participants. In addition, generalizability of this questionnaire is limited to a specific group, although it could be applied for future study.

In conclusion, our developed tool has a moderate to high level of validity and reliability for Thai overweight or obese medical students. Reliability and validity measures are recommended if the questionnaire is used for other populations.

### Source of support and conflict of interest

This project was funded by Faculty of Medicine Siriraj Hospital, Mahidol University. The authors declare that they have no other conflicting interests.

### ACKNOWLEDGMENTS

The authors acknowledge support from the Faculty of Medicine Siriraj Hospital, Mahidol University, Siriraj Health Policy Unit, Division of Student Affairs, Faculty of Medicine Siriraj Hospital, Siriraj Fitness Center™ and Siriraj Medical Student Union for their cooperation.

Special thanks to Assist. Prof. Dr. Panom Katumarn, Assist. Prof. Dr. Nantawat Sitdhiraksa, Assoc. Prof. Dr. Sucheera Phattharayuttawat, Assist. Prof. Dr. Chulaluk Komoltri, Assoc. Prof. Dr. Pisit Lertwanich, Dr. Weerachai Srivanichakorn, Dr. Chaiwat Washirasaksiri, Dr. Pornpoj Pramyothin, Dr. Pennapa Kaweewongprasert, Dr. Titiporn Tuangratananon, Dr. Lokachet Tanasugarn, and Dr. Methawoot Khemmongkon about suggestions for this project.

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