Original Article

Discretionary Salt Intake and Readiness for Behavioral Change Among Women in Tehran

Abstract

Background: Since women's readiness for dietary behavioral change can be one of the most effective fundamental measures for reducing dietary salt intake in line with preventing chronic diseases in developing countries, the present study is aimed to determine the readiness for behavioral change in discretionary salt intake among women living in Tehran. **Methods:** The present cross-sectional study was conducted on 561 women referring to the women care units across city of Tehran. The self-administered questionnaire included assessment of nutrition-related knowledge on salt intake and its association with diseases, discretionary salt intake, stages of change, and self-efficacy of women. In addition, the logistic regression test was used to determine the predictors of women's readiness for behavioral change in discretionary salt intake. **Results:** 40% women had someone in the family who had such a limitation (salt intake-limited exposure group), while 81.6% always or often added salt to their foods. Moreover, one-third of the participants were in the stage of pre-contemplation and 41.2% were in the stage of preparation for reducing salt intake. Self-efficacy and salt intake-limited exposure were the two most important determinants of the women's readiness for behavioral change in discretionary salt intake, respectively: (OR = 1.1 95% CI: 1.06--1.14 $P < 0.001$; OR = 1.58, 95% CI: 1.03--2.42 $P < 0.03$). **Conclusions:** Results of the present study showed that increased self-efficacy is associated with higher levels of behavioral change among women. Since self-efficacy is very important for initiating and maintaining the behavioral change, women's empowerment for reducing salt intake necessitates putting the emphasis on increased self-efficacy as well as community-based nutritional interventions.

Keywords: *Behavior, readiness, salt*

Ashraf Pirasteh, Hamed Pouraram[1], Nahid Kholdi, Mitra Abtahi[2]

Department of Health and Social Medicine, Faculty of Medicine, Shahed University, Tehran, Iran, [1]Department of Community Nutrition, School of Nutritional Sciences and Dietetics, Tehran University of Medical Sciences, Tehran, Iran, [2]Department of Nutrition Research, National Nutrition and Food Technology Research Institute and Faculty of Nutrition Sciences and Food Technology, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Address for correspondence:
Mitra Abtahi, Nutrition Research Department, National Nutrition and Food Technology Research Institute and Faculty of Nutrition Sciences and Food Technology, Shahid Beheshti University of Medical Sciences, Tehran, Iran. E-mail: mitra_abtahi@yahoo.com

Introduction

Behavior change is a process which occurs in individuals with different levels of motivation and readiness for change.[1] Changing health-related behaviors can significantly affect some of the most important causes of death and diseases. Behavior plays a pivotal role in health. Evidence suggests that different behavioral patterns are deeply rooted in sociocultural conditions and depend on cultural background.[2,3] Currently, behavior change interventions have a high potential for changing the current pattern of diseases. It is difficult to change the genetic predisposition to diseases and social conditions, at least in the short term.[4]

Studies which assess individuals' readiness to change health behaviors reveal that over one-third of people in Netherlands, Germany, Austria, United States of America, Hungary, India, China, South Africa, Brazil, and Japan are at the pre-contemplation stage and few (8--14%) at the preparation stage.[5-7] Moreover, increase in age, level of education, and self-efficacy, and the existence of chronic diseases such as hypertension which requires the limitation of salt intake have been associated with placing individuals at higher levels of change.[5,7,8]

A study reported mean salt intake to be 10.3 g per day in urban and rural areas of Ilam Province, Iran.[9] Moreover, it is 11.47 g per day for adults in Isfahan, Iran.[10] In a study on adults (2014), daily salt intake was 9 g for men and 6.96 g for women, with 53.6% being discretionary salt intake or added salt in cooking or at the table.[11] The salt intake among Iranian has been estimated about 10--12 g/day,[12] but based on the most recent study (2018) the per capita salt intake in Iran is 9.25 g per day (95% confidence interval: 9.48--9.56)[13] which is still 2.5 times more

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than the amount of the World Health Organization (WHO) recommendation. In terms of salt intake, Iran is similar to Denmark (7.1 g/day in women and 10.6 g/day in men), China (12 g/day), Spain (9.8 g/day), and Japan (7.8 g/day).[14-17] Contrary to most developed countries in which the majority of salt intake (75%) results from processed food,[18,19] 50-60% of daily salt intake in Iran is the salt added in cooking or at the table.[11,20] To reduce salt intake, behavioral interventions are much more effective and cost-effective than population-level interventions.[21,22]

Studies show that in most developing countries including Iran and China, approximately 60--80% of the total salt intake is the salt added in cooking and at the table.[11,15] Therefore, the major solution must focus on discretionary salt intake, with a change in dietary habits and promotion of nutrition literacy and attitude for selecting low-salt foods which must be placed on the agenda so that the level recommended by WHO, that is, less than 5 g per day, can be achieved.[2,23]

No such study has yet been conducted in Iran on the reduction of salt intake. Few studies have been conducted in Iran on discretionary salt intake, and no information is available on Iranian women's readiness for changing this behavior. Thus, it seems necessary to conduct studies in order to examine women's readiness for changing the behavior of discretionary salt intake.

In the Iranian society, women have the most important role in nutrition planning and preparation of food for the family. They have the vital role of dietary patterns choice and shaping the taste of the family.[24] Mothers affect the dietary experience of family members, especially young children, and teach them the preference for the taste of salt.[25] They are responsible for cooking and controlling the amount of salt added to the food. Also, they have the important role of managing the food the family consumes. Thus, they were selected as representatives of the whole family.

The present study aimed to determine the readiness for changing the behavior of discretionary salt intake and its determinants in women residing in Tehran capital city in Iran.

Methods

Theoretical basis of research

The transtheoretical model of stages of change shows the time- and motivation-related aspects of change. This model presupposes that everyone passes the stages of pre-contemplation, contemplation, preparation, action, and maintenance.

Pre-contemplation

In this stage, individuals do not think about changing their behavior in the foreseeable future which is usually defined as the following 6 months. In this stage, individuals have no intention to change their behavior, but are aware of the problem or behavior.

Contemplation

Individuals think about a change in the foreseeable future but not immediately, defined as 1--6 months. In this stage, they are aware of and think about and reexamine their behavior, but have not yet made a decision.

Preparation

Individuals plan for changing their behavior in the near future which is often defined as the next month. In this stage, they decide to change their behavior.

Action

Individuals have significantly changed their lifestyle in the past 6 months. Since action is visible, a change in behavior is often considered synonymous with action.

Maintenance

Individuals maintain change for some time, usually 6 months or more. In this stage, the behavior is stable and permanent and individuals try to prevent regression.[1-3]

The model of stages of change have been employed in numerous diet-related studies in order to determine the stages of change in diet behavior, including the reduction of fat intake and increasing fiber, fruit, vegetable, and dairy intake, and its efficiency has been confirmed. Therefore, diet-related behavioral interventions are more effective if they are based on theories of health-related behavior change.[23,26-34]

Study design and participants

The present cross-sectional (descriptive-analytic) study was conducted on 561 women referring to women's primary health care units in east of Tehran, Iran, selected through convenience sampling.

Inclusion criteria:

1. Women who were willing to participate in the study;
2. were minimum 18 years of age;
3. were literate;
4. prepared food for the family;

Non-inclusion criteria:

1. Pregnant or breastfeed
2. have a low-sodium diet prescribed by doctors of dietitians;

Data collection tool

In this study, a researcher-made questionnaire was used that included four sections in the fields of nutritional knowledge, discretional salt intake, women's readiness to change behavior, and self-efficacy. The questions in this questionnaire were based on the aims of the study, review

of the studies, specific cultural and social conditions of Iranian women.

In the pilot study conducted to determine the ease of understanding the self-efficacy questionnaire, a sample of 15 women completes the questionnaire and expressed their opinions regarding their understanding of items. In the final version, changes were applied which included the adaptation of phrases to participants and creating an appropriate framework for them.

To determine the reliability of the instrument and internal consistency of the self-efficacy items, 30 women completed the questionnaire and Cronbach's alpha of 0.914 showed the internal consistency of this scale. To determine the face and content validity of the questionnaire, a panel of experts (10 experts and professors of nutritional sciences and health education) was used and their opinions regarding the clarity and appropriateness of questions for the objectives were applied. This study was approved by the Committee of Ethics in Research, Shahed University (IR.Shahed.REC.1394.280).

Demographic questionnaire included age, occupation, and level of education. Self-administered questionnaire consisted of several sections. In the first section measuring women's nutritional knowledge was regarding the relationship between high salt intake and diseases. Each correct response received the score of 1.[35] The other question was related to the presence of someone in the family who had limitations on salt intake. The answer "yes" showed the salt intake-limited exposure group in the family.

The second section focused on the discretionary salt intake. Over 60% of salt intake in Tehran is the salt added in cooking or at the table.[11] Also, it is difficult to precisely measure salt intake.[6,36] Therefore, in order to prevent the recall bias and since self-reported avoidance of salt intake has a high correlation with the actual behavior,[37] the habit of adding salt in cooking and at the table was questioned. Respondents could select one of the options of "always," "often," "sometimes," "rarely," or "never" (respectively scored 1 to 4) for each item on salt intake in cooking or at the table. To classify the responses, the answers given to these questions were congregated as "salt users" or "non-salt users." Non-salt users were those who never, rarely, or sometimes added salt in cooking or at the table. Salt users were those who had selected the answers "always" or "often."[38,39]

The third section determined the readiness for changing salt intake which was designed at the scale of stages of change based on the trans-theoretical model using the questionnaire used by Newson *et al*.[6] With this scale, the intention and decision of individuals regarding discretionary salt intake were determined by selecting one of the five stages of pre-contemplation, contemplation, preparation, action, and maintenance.[1] To determine the predictors of readiness for changing the behavior of discretionary salt intake, stages of change were divided into three categories of pre-contemplation (not ready for change), ready for change (including contemplation and preparation), and action (change has occurred, including action and maintenance).

The fourth section was on women's self-efficacy for reducing salt intake, including six questions scored on a five-point Likert scale from "not at all sure" to "completely sure" (scored 1–5, respectively). Minimum and maximum possible scores were 6 and 30, respectively. Questions in this section were designed based on the Persian adaptation of the general self-efficacy scale (GSES)[40] and self-efficacy in nutritional behavior scale (SENBS).[41]

Statistical analysis

Data were analyzed in SPSS version 16 (SPSS Inc., Chicago, IL, USA). Descriptive data are presented in absolute and relative frequency. The Kolmogorov--Smirnov test was used to determine the normality of quantitative data. The relationship between personal--social variables, knowledge, and self-efficacy with dependent variables (discretionary salt intake and stages of change in salt intake behavior) was assessed using Spearman's correlation and Chi-square test. In all tests, the significant level was <0.05. Logistic regression was employed to determine the predictors of readiness for changing the behavior of discretionary salt intake.

Results

Mean age of women was 36.21 ± 10.1 years, ranging from 18 to 60 years. Most women (36.2%) belonged to the age group of 30--39 years. Older women had lower levels of education ($r = 0.287$, $P < 0.001$). The level of education of 46.5% of women was university, and 38.8% (218 women) had high school diploma. Also, 66.6% of women were homemakers. Employed women had levels of education three-fold higher than that of homemakers ($P < 0.001$). Relative frequency of discretionary salt intake in cooking and at the table based on women's characteristics is presented in Table 1.

40% women had someone in the family who had such a limitation (salt intake-limited exposure group). Compared with younger women, more women aging 40 years or older belonged to the salt intake-limited exposure group ($P < 0.01$). The knowledge of women regarding the relationship between salt intake and diseases was undesirable in 44.7% of cases (i.e., they had answered less than half of the questions correctly), and only 28% of women had a desirable knowledge of this matter. Mean score of self-efficacy for reducing discretionary salt intake was 19.58 ± 6.4.

Table 1: Relative frequency of discretionary salt intake in cooking and at the table based on women's characteristics

	Salt intake in cooking			Salt intake at the table		
	Yes	No		Yes	No	
	n=458	*n*=103		*n*=128	*n*=433	
Age (years)*						
30>	86.1	13.9		29.5	70.5	
30-39	81.1	18.2		20.7	79.3	
≥40	77.6	22.4		19.3	80.7	
P	Chi-square test		0.114	Chi-square test		0.047
Level of education						
Below high school diploma	74.4	25.6		34.1	65.9	
High school diploma	81.2	18.8		20.2	79.8	
University	84.3	15.7		21.5	78.5	
P	Chi-square test		0.127	Chi-square test		0.029
Occupation						
Homemaker	82.6	17.4		23	77	
Employed	79.7	20.3		22.5	77.5	
P	Fisher's exact test		0.419	Fisher's exact test		0.915
Salt intake-limited exposure						
Yes	77.6	22.4		24.7	75.3	
No	84.3	15.7		21.6	78.4	
P	Fisher's exact test		0.046			0.412
Knowledge level						
Desirable	84.2	15.8		22.3	77.7	
Undesirable	78.5	21.5		23.5	76.5	
P	Fisher's exact test		0.1			0.762
Self-efficacy score						
Mean±SD	18.94±6.3	22.45±6.3		15.05±5.7	20.92±5.9	
P	Mann-Whitney test		0.001	Mann-Whitney test		0.001

Discretionary salt intake in cooking

In cooking, over half of the women (52.6%), 163 women (29.1%), and 39 women (6.9%) always, often, and never added salt to food, respectively. Adding salt to food while cooking had a significant correlation with the salt intake-limited exposure (Fisher's exact test, $P < 0.01$).

Discretionary salt intake at the table

Mean score of self-efficacy was higher in women who did not consume salt at the table than those who did ($P < 0.001$) [Table 1].

Table 2 shows the total discretionary salt intake based on demographic and other characteristics of women. In general, 66% of women were salt users.

Stages of behavior change of discretionary salt intake

In terms of the behavior changing of discretionary salt intake stages, about one-third of women (31.9%) were in pre-contemplation, following by 22.3% in contemplation, 18.9% in preparation, 8.2% in action, and 18.7% in maintenance.

Table 3 presents the relationship between stages of changing the behavior of discretionary salt intake in terms of pre-contemplation, readiness (contemplation and preparation), and action (action and maintenance) with women's characteristics. The stage of change moved forward with increasing the score of self-efficacy ($r = 0.42$, $P < 0.001$). A positive correlation was observed between self-efficacy score and categorized levels of change ($r = 0.42$ and $P < 0.001$).

Table 4 shows that to determine the factors associated with women's readiness for behavior change, predictor variables, including age, level of education, occupation, salt intake-limited exposure in the family, knowledge level regarding the relationship between salt intake and diseases, and self-efficacy score were entered into logistic regressions. In this Table, we compared pre-contemplation and preparation stage of salt intake among women. Results showed that self-efficacy and salt intake-limited exposure are the most important factors determining women's readiness for changing the behavior of discretionary salt intake compared with women in the pre-contemplation stage.

Discussion

The present study determined readiness for changing the behavior of discretionary salt intake in adult women residing in Tehran. Results revealed that the majority of women were at the pre-contemplation stage. A limited

Table 2: Discretionary salt intake based on the personal-demographic characteristics of women

Characteristics of women		Salt users *n*=370		Non-salt users *n*=191		Total *n*=561		*P*
		n	%	*n*	%	*n*	%	
Age (years)*	<30	122	73.5	44	26.5	166	29.59	Chi-squared tests
	30-39	129	63.5	74	36.5	203	36.18	*P*=0.048
	≥40	119	62	73	38.0	192	34.22	
Level of education	Below high school diploma	56	68.3	26	31.7	82	14.62	Chi-squared tests
	High school diploma	143	65.6	75	34.4	218	38.86	*P*=0.889
	University	171	65.5	90	34.5	261	46.52	
Occupation	Homemaker	251	67.1	123	32.9	374	66.67	Fisher's exact test
	Employed	119	63.6	68	36.4	187	33.3	*P*=0.450
Salt intake limitation in the family	No	223	66.0	115	34.0	338	60.2	Fisher's exact test
	Yes	147	65.9	76	34.1	223	39.8	*P*=1
Knowledge level	Undesirable	165	65.7	86	34.3	251	44.7	Fisher's exact test
	Desirable	205	66.1	105	33.9	310	55.3	*P*=0.929
Scores of self-efficacy**	Mean±SD	17.78±6		23.08±5.6				Mann-Whitney test
								P<0.001

Table 3: Frequency distribution of stages of changing the behavior of discretionary salt intake in women

		Stages of change in the behavior of discretionary salt intake								
		Pre-contemplation *n*=179		Contemplation and preparation *n*=231		Action and Maintenance *n*=151		Total *n*=561		*P*
		n	%	*n*	%	*n*	%	*n*	%	
Adding salt in cooking	Never	1	2.6	4	10.3	34	87.2	39	6.9	Chi-squared
	Sometimes	2	3.1	13	20.3	49	76.6	64	11.4	*P*<0.001
	Often	40	24.5	56	34.4	67	41.1	163	29	
	Always	136	46.1	158	53.6	1	0.3	295	52.5	
Adding salt at the table	Never	73	24.5	92	30.9	133	44.6	298	53.1	Chi-squared
	Sometimes	44	32.6	75	55.6	16	11.9	135	24.0	*P*<0.001
	Often	36	46.2	40	51.3	2	2.6	78	13.9	
	Always	26	52.0	24	48.0	0	0	50	8.9	
Level of education	Below high school diploma	24	29.3	34	41.5	24	29.3	82	14.6	Chi-squared
	High school diploma	66	30.3	93	42.7	59	27.1	218	38.8	*P*=0.874
	University	89	34.1	104	39.8	68	26.1	261	46.5	
Occupation	Homemaker	116	31	164	43.9	94	25.1	374	66.7	Chi-squared
	Employed	63	33.7	67	35.8	57	30.5	187	33.3	*P*=0.169
Age (year)	<30	69	41.6	62	37.3	35	21.2	166	29.6	Chi-squared
	30-39	59	29.1	82	40.4	62	30.5	203	36.2	*P*=0.02
	≥40	51	26.6	87	45.3	54	28.1	192	34.2	
Knowledge of the relationship between salt intake and diseases	Desirable	98	31.6	134	43.2	78	25.5	310	55.3	Chi-squared
	Undesirable	81	32.3	97	38.6	73	29.1	251	44.7	*P*=0.468
Salt intake limitation in the family	No	118	34.9	127	37.6	93	27.5	338	60.2	Chi-squared
	Yes	61	27.4	104	46.6	58	26.0	223	39.8	*P*=0.074
Self-efficacy score	Mean±SD	16.28±5.8		19.70±5.9		23.33±5.6				Spearman's
										P<0.001

number of participants were in the maintenance stage and had a significantly higher self-efficacy score compared with those in the pre-contemplation stage.

Level of education is an indicator of the socioeconomic status and helps a healthy diet. In the present study, the level of education had a significant correlation with the amount of salt added at the table, and women with university education consumed less salt at the table than women with an education level below high school diploma. Chen Ji[42] showed that those with a lower level

Table 4: Logistic regression analysis for some extracted variables

	Odds Ratio	95% Confidence Interval	*P*
Age	1.002	0.978-1.026	0.887
Occupation	1.355	0.804-2.283	0.254
Level of education	1.127	0.663-1.916	0.660
Self-efficacy score	1.102	1.061-1.144	0.000
Salt intake- limited exposure	1.578	1.027-2.426	0.038

Variables entered in to the model: age, occupation, level of education, self-efficacy score, salt intake- limited exposure

of education consume more salt. Similarly, Jeong showed that those with low income and education level consume more salt.[43] It is clear that a low level of education is a serious limitation for achieving dietary knowledge and selecting healthy dietary behaviors.[44] The role of women is more important considering the pivotal role in buying the ingredients, preparing food, regulating the diet, and dietary choices.[45]

In the present study, occupation as another indicator of socioeconomic status showed no significant correlation with levels of changing the behavior of discretionary salt intake. Chen Ji[42] showed that the level of salt intake was higher in those with lower levels of occupation.

These factors include a range, from individual determinants to environmental, social, and cultural characteristics. They direct individuals to attach importance to the type and quality of food based on economic conditions of the family, ensuring health, and meeting the needs.

A significant positive correlation was observed between stages of change and self-efficacy scores. In other words, self-efficacy scores increased as individuals advanced in the stages of change toward action and maintenance. In the action and maintenance stage, 87% of participants never added salt in cooking. Moreover, 45% of women in this stage never added salt to food at the table.

The study by Newson[6] showed that 22% of the sample often or always added salt to food before tasting it and 58% never added salt to food at the table. Over one-third (34%) of participants were in pre-contemplation and 28% in maintenance stages, and only 8% of the sample were at the stage of readiness for changing the behavior of discretionary salt intake, inconsistent with the results of this research.

Vander Veen[5] used the stages of change model in the Netherland among men and women aged 19--70 years to show that 32% of participants were at the pre-contemplation, 14% at the dynamic (contemplation, preparation, and action), and over half of them (54%) at maintenance stages. Discretionary salt intake in cooking or at the table was lower in the maintenance group than dynamic and pre-contemplation groups.

Results of a study by Ni in New York showed that only 38% of patients who were aware of reducing salt intake actually practice it. Knowing that salt intake must be limited but not acting upon it shows that these individuals are at preparation, contemplation, or pre-contemplation stages of change.[46] Another important point is that despite having knowledge regarding the importance and benefits of a healthy dietary pattern, practices differs.[5,6,46] This shows that specific measures compatible with the social context must be taken by policymakers to change this behavior among women, and education alone does not suffice in planning. Measures such as correction of the dietary environment at home may help.

A quasi-experimental study in Malaysia used the stages of change model to evaluate the behaviors of patients with hypertension in relation to doing regular exercises, reducing salt intake, and increasing the consumption of fruits and vegetables. Results revealed that patients in action and maintenance groups had significantly reduced salt intake compared with those in pre-contemplation and preparation groups.

In recent study by Jeong, the most important aspect of readiness for changing a behavior was a high self-efficacy score.[43] Participants considered environmental support and motivation as the most important factors leading to behavioral change, consistent with the results of Chen.[42]

Assessing Iranian women's readiness for change is the first step toward the assessment and promotion of food and nutrition literacy. Readiness for changing behaviors is a novel concept which receives considerable attention today. However, few studies have been conducted on this issue among women.[36,38,39]

According to studies, the assessment of readiness for changing behaviors has the best results when the context is defined well. In the present study, women's readiness to change the behavior was assessed using a valid questionnaire which included different dimensions of behavior change at home.

Conclusions

Results of the present study showed that the evaluation of the stage of readiness for changing dietary behaviors can be a useful tool in interventional studies which aim to change dietary behaviors since it provides the opportunity to identify readiness for change in different social groups. The evaluation of readiness for changing a behavior is a novel concept in society-level dietary interventions. These instruments and questionnaires can be easily implemented by experts and health workers. Therefore, it can be used in large society-level studies after corrections and final approval.

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Conflicts of interest

There are no conflicts of interest.

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