



Nutrition Knowledge, Attitude and Practice among Health Staff in Iran: the NUTRI-KAP Survey

Ramin Heshmat¹, Zahra Abdollahi², Mina Minaei², Mahsa Rostami¹, Zeinab Ahadi¹, Gita Shafiee^{1,3}, Mohsen Rezaei Homami⁴, Bagher Larjani³, and Forouzan Salehi^{2*}

¹Chronic Diseases Research Center, Endocrinology and Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

²Community Nutrition Department, Ministry of Health and Medical Education, Tehran, Iran

³Endocrinology & Metabolism Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

⁴Rasoul-e-Akram Hospital Complex, Iran University of Medical Sciences, Tehran, Iran

Abstract

Original Article

Received Date:

Jan.11.2018

Revised Date:

Feb.16.2018

Accepted Date:

Mar.09.2018

✉Correspondent Author:

Dr. Forouzan Salehi
Community Nutrition
Improvement Office of the
Ministry of Health and Medical
Education, Tehran, Iran
salehi46@yahoo.com

Introduction: The role of diet is crucial in the prevention of diseases. Physicians and health staff can play a vital role in decreasing disease. The purpose of this study was to determine the knowledge, attitude, and practice of Iranian health staff toward nutrition.

Methods: In a cross-sectional study on 473 health staffs of the Iranian health staff from 30 provinces of Iran were involved in this study during 2011-2012. The sampling method in this study in each province was stratified random sampling. KAP was assessed by a self-administered questionnaire.

Results: Approximately 40%-90% of participants knew the main groups of food; 44%-74% of them had information about importance of micronutrients, and the knowledge of health and nutritional needs of pregnant and lactating mother was 84%-88%. Health staffs' favorite attitude toward the major food groups and micro-nutrition were 49%-90% and 26%-86%, respectively. And for the major food groups was 28%-98% and practice about health and nutritional needs of pregnant women and mothers was 80%-92%.

Conclusion: This study shows health staffs need more training on some topics of nutrition in Iran. Consequently, intervention programs and nutrition education to improve employee performance in the health center is necessary.

Keywords: Knowledge, Attitude, Practice, Health Staff, Nutrition

Introduction

Healthy diet and eating nutrient-dense foods for maintaining a healthy weight and prevention of chronic disease are essential at all stages of life.

Dietary factors have a crucial role in some types of cancer^{1,2}. And also imbalanced intake of foods high in energy and low in essential nutrients contributes to overweight and obesity³. Nutrition patterns of people have changed throughout the past decades around the world⁴. Manpower training is the most important factor in quality improvement. Physicians and health staff can play a crucial role in decreasing disease, weight problems, and obesity with appropriate nutrition counseling.

A study in Riyadh among primary care physician showed that their Knowledge about nutrition is low⁵. Since they are a reliable source of nutritional information for

patients. Insufficient knowledge of nutrition and inability to transfer to the community among health staff are important causes of failure in disease prevention. Therefore, awareness and proper attitude of nutrition patterns are essential among health care workers.

Past studies revealed a lack of nutritional knowledge among physicians in the United States⁶⁻⁸. A study among primary health care in the Center in Jeddah indicated that physicians need more training on nutrition⁵.

The study on nutritional knowledge of physicians and health staff indicated knowledge attitude and practice among physicians is more than health staffs⁹. Another study showed a need for improvements in the nutritional knowledge and practices of primary care physicians in Taiwan¹⁰.

In order to design a proper nutrition, it is essential to understand the factors associated with individual's food choices, such as nutrition knowledge, attitude, and

practice. Considering that since studies regarding of nutrition have not been done in the provinces of Iran. And no information in this field, therefore, study in this field is essential. The purposes of this research were to survey the knowledge, attitude, and practice of Iranian health staff on nutrition.

Materials and Methods

The study population

This cross-sectional study was conducted during September to October 2008 in health centers in Iran. The statistical unit of this study was health staffs who have worked for more than 6 months in centers of Primary health care, such as physicians, health experts, nutritionists, family health technicians, and health assistants.

Sampling design and Sample size

Detailed description of the method has been published previously¹¹. The sampling method in this study in each province was stratified random sampling. The sample size for health staff was considered as 432 people in all provinces of Iran. And it calculated for the estimated ratio of proper knowledge to be 80% and estimated precision to be 12% and considering the probability of type I error to be 5%. Regarding the response rate to be 80%, so final sample size was increased to 480 people.

Tools for collecting data

Data collection of this study was based on completed through self-administered questionnaires for physicians and nutritionists' staffs and structured questionnaire and interview for health technicians and assistants. Some questions were included in the survey to characterize respondents such as age, sex, marital status, occupation, Occupation of spouse, number of children and etc. while other questions were generated with expert advice from a panel of nutritionists, epidemiologists and health educators. The study was conducted on 118 items, two reviews were performed by the panel to choose the best in terms of clarification and correctness of the questions. The ability of each individual item to distinguish among people with different levels of knowledge was measured by correlating the score on each it and with the overall test score. In order to assess the reliability of the questionnaire, then to determine different levels of nutritional cognizance by nutritionists was investigated. In addition, if the questionnaire were defective, then they returned them to the interviewer for more clarity and Correction of mistakes. Then the auditors also will control the process of sampling and they were randomly

rechecked 10% of the questionnaires of each province to identify any mistake.

Statistical analysis

The data were analyzed by the SPSS ver18. We reported the descriptive variables as frequency %95 CI. The method of sampling (nu) we considered in all statistical analysis. The significant level was P-value < 0.05.

Results

A total of 473 of health Center Staffs were eligible for participation in the study. The samples were composed of 20% women and 80% men in this study. And the mean age of the participants was between 30 and 60 or over years of age. The majority (59.2%) had been in these centers for more than 7 years.

The results in Table 1 indicate that approximately 80% of the participants knew the main groups of food, 50% of them were aware of the main role of meat and bean as a major source of protein for development. But only 37% of participants had information about plant protein sources. In addition, the majority of the staffs were aware about the main role of milk and dairy products, fruits and vegetables, respectively 55%, 82% and 75%, respectively. But awareness about the amount of fruits and vegetables intake in during day was 40% and 44%, respectively. Knowledge of nutritional risk factors for non-communicable diseases was 80%. Also, 89% of the staffs were aware of fruit and vegetables as antioxidant sources. But only 44% of them had information which vitamin A, E and selenium are antioxidant. Furthermore, 72% of participants knew red meat is the main source of iron. And only 47% knew chicken can be a good source of iron. And finally, only 32% of participants had enough information about effect of carbonated drinks on calcium excretion by phosphorus content. The majority of health staffs in 90% of questions expressed more favorable attitude in this section. The unfavorable attitude among participants was about the mix (spinach and yogurt) as one of the good sources of calcium, equal importance to both the diversity and balance in food group's intake, allowability of cocoa milk consumption for a child who refuses to drink plain milk, olive oil is not good for frying 65%, 45%, 41%, and 32%, respectively (Table 2).

Table 3 shows the performance among the health staffs. We can see only 29% of the staffs had correct practice in association with vegetable intake and 50% of them had correct practice for do not use olive oil, normal sunflower oil, and solid vegetable oil. A majority of participants had correct practice about recommended intake of milk among people with lactose intolerance. Only 80% of

health staffs had correct performance about recommendations for refined iodized salt consumption.

Table 1- Gender Based Comparison of Weight for Age Status Before and After the Intervention

Titles of Knowledge	Frequency (%)	CI 95%
• Knowing of basic food groups	82.24	(78.49-85.58)
• Knowledge of the need to use of five major food groups	44.40	(39.86-49.00)
• Knowing of the main role of bread and cereal foods as the main source for work and activity	83.51	(79.85-86.74)
• Knowing of the main role of meat and bean as major source of protein for development	58.35	(53.76-62.83)
• Information about increasing the nutritional value of legume proteins	52.85	(48.24-57.42)
• Knowledge of plant protein sources	37.63	(33.24-42.17)
• Correct classification of eggs in the meat group	75.48	(71.34-79.28)
• The main role of milk and dairy products for healthy bones and teeth	55.39	(50.78-59.93)
• Knowing of the equivalent unit in milk and dairy groups	63.00	(58.47-67.36)
• Knowing of curd as the main source of protein and calcium	55.60	(50.99-60.13)
• Knowing of the main role of fruits as one of the sources of vitamins, Minerals and dietary fiber	82.24	(78.49-85.58)
• Knowing of the equivalent unit in group of fruits	53.28	(48.66-57.84)
• Knowledge of requires a daily intake of 2-4 fruit unit	40.80	(36.33-45.38)
• Knowing of main role vegetables as one of the sources of vitamins, minerals, and dietary fiber	75.05	(70.89-78.89)
• Awareness of the need for a daily intake of 3-5 units' vegetables	44.61	(40.06-49.61)
• Knowledge of components of vegetable groups	94.08	(91.55-96.03)
• Knowledge of equivalent unit in vegetable groups	77.38	(73.33-81.07)
• Correct classification of cream and the milk in fat group	44.40	(39.86-49.00)
• Knowledge of optimal standard of trans fatty acids and saturated fatty acids in edible oils	9.94	(7.39-12.99)
• Knowledge of relation between trans fatty acids intake with cancer, cardiovascular disease, and high cholesterol	90.91	(87.95-93.34)
• Knowing of nutritional risk factors of non-communicable diseases (obesity and overweight, malnutrition in utero and during the first two years of life, low intake of fruits and consuming too much salt.	80.55	(76.69-84.02)
• Knowing of fruit and vegetable groups as major source of antioxidant	88.79	(85.60-91.49)
• Knowing of vitamin A and E and selenium as antioxidant	44.82	(40.27-49.42)
• Awareness of the role of antioxidants and Prevention in cardiovascular disease, cataracts, and rheumatoid arthritis	59.20	(54.61-63.66)
• Knowing of risk factors for osteoporosis (Aging, menopause in women, physical inactivity)	62.37	(57.82-66.75)
• Knowing of sunlight as the main source of vitamin D	85.20	(81.67-88.27)
• Knowledge of better absorption of calcium from low-fat dairy	49.89	(45.29-54.49)
• Knowing of liver and meat and nuts as the main food sources	71.04	(66.71-75.08)
• Knowing of the effects of zinc deficiency	80.97	(77.13-84.41)
• Knowing of red meat as the main source of iron	71.88	(67.59-75.89)
• Knowing of effect bread containing baking soda in the decreased absorption of non-heme iron	90.49	(87.47-92.97)
• Knowing of chicken as a good source of iron compared to vegetable sources	46.72	(42.15-51.33)
• Knowing of side effects of iron deficiency (Increased risk for low birth weight, loss of school, disruption of the body's motor system in infants	81.40	(77.59-84.80)
• Identification of micronutrients in preventing anemia (Iron, folate, vitamin B ₁₂)	74.00	(69.79-77.89)
• Knowing of most appropriate indicators to quickly assess the nutritional status of children under two years (weight for age)	57.93	(53.33-62.42)
• Knowledge of daily consumption of 0.5 cc drop(A+D) or multivitamins for up to two years	68.08	(63.66-72.25)
• Knowledge of daily consumption of 15 Iron drops from the age of six months	86.26	(82.82-89.23)
• Knowledge of need to iron for pregnant mothers from sixteenth week of pregnancy until three months after giving birth	84.36	(80.76-87.51)
• Knowledge of best time for folic acid intake (from three months before pregnancy until the end of pregnancy)	90.49	(87.47-92.97)
• Knowledge of the particular circumstances of liquids intake when exclusive breast-feeding (Diarrhea)	88.58	(85.36-91.30)
• Knowing of food sources of iodine supplier	80.97	(77.13-84.41)
• Knowledge of proper storage of refined iodized salt (Dark and closed containers)	91.97	(89.13-94.25)
• Knowing of cereal as sources of dietary fiber	88.37	(85.13-91.11)
• Knowing the role of dietary fiber in the prevention of diseases and cancer	89.22	(86.06-91.86)
• knowing effect of carbonated drinks on calcium excretion by phosphorus content	32.35	(28.14-36.76)
• Knowledge of the harmful effects of fast food because of trans and saturated fatty acids and salts	82.03	(78.26-85.38)

Table2: The results of the attitude of health staffs: the NUTRI-KAP study

Attitude Subject	Unfavorable Attitude	Neutral	Favorable Attitude
	Percent (CI 95%)	Percent (CI 95%)	Percent (CI 95%)
• The importance of children nutritional needs versus adults' nutritional needs	3.17 (1.92-5.2)	0.42 (0.11-1.68)	94.41 (94.29-97.76)
• The necessity of equal food intake in both genders, when there are small amounts of food	2.33 (1.29-4.17)	1.69 (0.85-3.36)	95.97 (93.77-97.42)
• Equal importance to both the diversity and balance in food groups intake	45.03 (40.58-49.56)	5.92 (4.11-8.45)	49.05 (44.55-53.57)
• Bread and cereals as the major source of daily energy	7.42 (5.36-10.16)	1.91 (0.99-3.63)	90.68 (87.69-93.0)
• The advantages of using rice instead of rice	10.36 (7.91-13.46)	2.75 (1.6-4.68)	86.89 (83.53-89.65)
• Providence of daily protein needed of other food groups apart from meat and beans	21.23 (17.76-25.17)	2.97 (1.76-4.96)	75.8 (71.71-79.46)
• The advantages of using fish instead tuna fish	4.66 (3.08-6.99)	1.69 (0.85-3.6)	93.64 (91.04-95.53)
• Allowability of cocoa milk consumption for a child who refuses to drink plain milk	40.8 (36.44-45.31)	8.67 (6.44-11.57)	50.53 (46.01-55.03)
• Fruits and vegetable groups as main suppliers of vitamins needed daily	8.47 (6.27-11.36)	1.69 (0.85-3.36)	89.83 (86.75-92.26)
• Reducing vitamins in vegetables by freezing them	10.36 (7.91-13.46)	3.81 (2.41-5.97)	85.84 (82.38-88.71)
• Providence of fiber needed from other groups in addition vegetable groups	20.76 (17.33-24.67)	5.51 (3.77-7.98)	73.73 (69.55-77.52)
• Olive oil is not good for frying	32.42 (28.33-36.79)	6.14 (4.3-8.71)	61.44 (56.95-65.74)
• Harmful effects of solid oil intake on health because of saturated and unsaturated fatty acids	5.3 (3.6-7.73)	3.18 (1.92-5.21)	91.53 (88.64-93.73)
• Walnut as one of the sources of omega-3 fatty acid	5.5 (3.76-7.96)	6.13 (4.29-8.69)	88.37 (85.14-90.97)
• The mix (spinach and yogurt) as one of the good sources of calcium	64.62 (60.18-68.82)	9.11 (6.82-12.07)	26.27 (22.48-30.45)
• Animal protein as good source of zinc	9.77 (7.39-12.81)	14.65 (11.73-8.15)	75.58 (71.48-79.27)
• The necessity of this matter which does not take iron with milk	6.77 (4.82-9.42)	3.81 (2.41-5.97)	89.43 (86.31-91.91)
• Differences in the absorption of iron from plant sources than animal sources	11.86 (9.23-15.22)	4.87 (3.25-7.24)	83.26 (79.61-86.38)
• Increasing need for pregnant and lactating mothers to foods	30.66 (26.65-34.98)	1.9 (0.99-3.62)	67.44 (63.07-71.53)
• Adequacy of breast milk during the first six months of life for enough energy and protein needs	6.36 (4.47-8.96)	1.06 (0.44-2.53)	92.58 (89.84-94.64)
• Supplementary feeding is not permitted with food table	16.91 (13.79-20.58)	0.42 (0.11-1.68)	82.66 (78.97-85.83)
• Promote tooth decay in pregnant women even with identical calcium intake than other members of the family	15.01 (12.06-18.53)	4.65 (3.08-6.97)	80.34 (76.49-83.69)
• Role of the fruits and vegetables in the presentation of cancer by other their materials contained in them in addition to fiber	23.89 (20.25-27.96)	8.03 (5.89-10.86)	68.08 (63.72-72.14)
• The beneficial effects fiber intake in the prevention of overweight and obesity	6.57 (4.65-9.2)	3.39 (2.08-5.47)	90.04 (86.98-92.44)
• Health Risks due to the consumption of diet drinks	6.57 (4.65-9.2)	3.39 (2.08-5.47)	90.04 (86.98-92.44)
• The relation between non-communicable diseases and malnutrition untreated in utero and during the first two years of life	5.73 (3.95-8.24)	5.94 (4.13-8.49)	88.32 (85.08-90.93)
• Prefer to drink water instead of tea, while thirsting	4.86 (3.25-7.22)	3.17 (1.92-5.2)	91.97 (89.14-94.11)
• Do not watch the TV while eating	4.23 (2.74-6.47)	5.71 (3.94-8.21)	90.06 (87.01-92.46)
• Impermissibility of remove main meal in weight loss diets	3.38 (2.08-5.46)	0.63 (0.2-1.96)	95.98 (93.78-97.43)
• Unsolving of society's nutritious problems considering amendment of the family' income situation	29.66 (25.7-33.96)	4.24 (2.75-6.49)	66.1 (61.69-70.25)
• Untacking of malnutrition problems resulted from genetic issues in children by training families	3 (1.8-4.9)	1.9 (1-3.6)	95.1 (92.8-96.8)

Table 3: The results of the performance among health staffs: the NUTRI-KAP study

Titles of practice	Frequency (%)	CI 95%
• Recommended daily consumption of 2-4 fruit unit	28.96	(24.91-33.28)
• Consumption of bran biscuit	98.31	(96.69-99.26)
• Olive oil, normal sunflower oil, and Solid vegetable oil	49.68	(45.08-54.28)
• Gradual consumption of milk to one glass of milk per day	70.19	(65.84-74.28)
• Investigation people who live in areas of the prevalence of intestinal parasites and intestinal worms	84.36	(80.76-87.51)
• Drop A+D	42.11	(8.69-14.63)
• Consumption of iron amounted to 1.5 cc	35.52	(31.20-40.01)
• Recommend daily intake 25 drops of multivitamin (A+D) and also 15 drops of Iron from 6 months to four -month-old baby that use of artificial milk.	79.28	(75.34-82.84)
• Recommends the use of solid foods and low-fat	91.97	(89.13-94.25)
• Recommends to increase of 6-9 kilogram the pregnant woman	92.81	(90.09-94.97)
• Recommend therapeutic dose of iron supplements for treatment of anemia and then daily intake an iron tablets to pregnant women with hemoglobin 10	80.76	(76.91-84.21)
• Identify infants requiring referral to a doctor (7-months -old infant with a constant weight in three consecutive and 11-months infant with a decline in the growth curve)	77.16	(73.11-80.87)
• 4-years-old children tend to eat a diet consistent and encourage them to eat a variety of foods (by providing food with interesting shapes)	80.97	(77.13-84.41)
• Recommendations for refined iodized salt consumption	79.70	(75.79-83.23)
• Reduction in food intake such as sausages, canned and roasted nuts	93.02	(90.34-95.14)
• Recommendations for vegetable and fruit consumption	93.66	(91.06-95.68)
• There is no problem for rarely used fast food	39.96	(35.51-44.52)
• Recommended for low-fat milk and yogurt consumption	98.10	(96.41-99.12)



Discussion

The responses of health staff and physicians to the questionnaires of NUTRI-KAP study showed that the frequency of awareness about major food groups and their roles was 40%-90%, and the awareness about the importance of micronutrients was 44%-74%. In addition, knowledge of health staffs about child nutrition and health was 57%-86%. Finally, the best-known item (answered correctly at the highest frequency) was awareness of the health and nutritional needs of pregnant and lactating mothers (84%-88%).

In another survey of nutrition knowledge, primary care physicians carried out in Saudi Arabia indicated that they need more education in nutrition¹². On the other hand, the results of the research on the nutrition knowledge level of Turkish physicians indicate that the nutrition knowledge level of physicians is inadequate¹³. Early interference to provide a healthy diet may have an important effect in illness prevention. It seems the most important aspect of health preferment is providing individuals with the ability to convey accurate information about nutrition. Health staffs and physicians play a crucial role in the decrease and preventing of disease with proper nutrition counseling. Since the nutrition knowledge level of them is inadequate in some cases. And according to some other studies, the current study indicates that health staff working in these centers need to more education on some topics of nutrition.

In addition, Studies showed that health staffs' favorite attitude toward the major food groups and their roles was 49%-90% and unfavorable attitude was 7%-45%. The frequency of the favorable and unfavorable attitude of the importance of micronutrients was 26%-86% and 5.5%-64%, respectively. The frequency of the favorable attitude toward Child Nutrition and health was 50%-96% and their unfavorable attitude was 3%-40%. The frequency of the favorable and unfavorable attitude of health and nutritional needs of pregnant and lactating mothers were 67%-80% and 17%-30%, respectively. Despite having positive attitudes about nutritional assessment, we can see there are unfavorable attitudes on some topics. Studies have shown there is a significant correlation between nutrition knowledge and attitudes among primary care physicians in Taiwan¹⁰.

Performance questionnaire of health staffs indicated a rate of correct answers of 28%-98%, 35%-80% and 80%-92% for the major food groups, child nutrition and health and nutritional needs of pregnant women and mothers, respectively.

There are individual factors associated with nutrition practice of health staffs include knowledge of nutrition,

perceived skills and attitude about nutrition¹⁴. In addition, there are factors associated with recommended nutrition management practices included acceptance the efficacy of diet counseling, good relationship with patient and health staffs' confidence in their skill to counsel patients to modification eating patterns¹⁵⁻²⁰. A high proportion of people are in contact with health staffs each year, thus offering convenient opportunities for evaluation and education²¹.

Physicians are perceived as an extremely reliable source of health information²¹. Studies in Shiraz showed that an educational intervention to improve knowledge of nutrition counseling during pregnancy is essential. Other studies showed that in general, practitioners' knowledge, attitude and practice scores are higher than the other groups, which is probably because of higher level of education and socioeconomic status in health care team⁹. In hospitals that there are persons with knowledge of nutrition, patients can get correct information about nutrition and diet patterns. It should be considered that early intervention to provide a healthy diet may have an enormous effect on the prevention of diseases²². According to the fact that prevention of disease is more cost effective than treating, and considering the importance of nutrition in the physical and intellectual development of the individual and community, intervention programs and nutrition education to improve the performance of healthcare team is necessary.

Conclusion

This survey shows that health staffs need more training in some topics of nutrition in Iran. However, multiple barriers may prevent the health staffs from providing dietary counseling, such as lack of confidence in counseling skills, time limitations, and deficiency of available resources. So, development and implementation of nutrition intervention programs at the macro level can be helpful.

References

1. Martínez-González, M., Sanchez-Villegas, A., De Irala, J., Marti, A. & Martínez, J. Mediterranean diet and stroke: objectives and design of the SUN project. Seguimiento Universidad de Navarra. *Nutritional neuroscience* 5, 65-73 (2002).
2. Pekka, P., Pirjo, P. & Ulla, U. Influencing public nutrition for non-communicable disease prevention: from community intervention to national programme-experiences from Finland. *Public Health Nutrition* 5, 245-252 (2002).

3. Bray, G. A. & Popkin, B. M. Dietary fat intake does affect obesity! *The American journal of clinical nutrition* 68, 1157-1173 (1998).
4. Wardle, J., Parmenter, K. & Waller, J. Nutrition knowledge and food intake. *Appetite* 34, 269-275 (2000).
5. Al-Zahrani, A. M. & Al-Raddadi, R. M. Nutritional knowledge of primary health care physicians in Jeddah, Saudi Arabia. *Saudi medical journal* 30, 284-287 (2009).
6. Krause, T. & Fox, H. Nutritional knowledge and attitudes of physicians. *Journal of the American Dietetic Association* 70, 607-609 (1977).
7. Feldman, E. B. Networks for medical nutrition education--a review of the US experience and future prospects. *The American journal of clinical nutrition* 62, 512-517 (1995).
8. Mlodinow, S. G. & Barrett-Connor, E. Physicians' and medical students' knowledge of nutrition. *Academic medicine: journal of the Association of American Medical Colleges* 64, 105-106 (1989).
9. Sajjadi, F. *et al.*: Nutritional knowledge attitude and practice of health professionals about cardiovascular diseases. *Journal of Birjand University of Medical Sciences* 15, 65-72 (2008).
10. Hu, S.-P., Wu, M.-Y. & Liu, J.-F. Nutrition knowledge, attitude and practice among primary care physicians in Taiwan. *Journal of the American College of Nutrition* 16, 439-442 (1997).
11. Azemati, B. *et al.* Nutritional knowledge, attitude and practice of Iranian households and primary health care staff: NUTRIKAP Survey. *Journal of Diabetes & Metabolic Disorders* 12, 12 (2013).
12. Al-Numair, K. S. Nutrition knowledge of primary care physicians in Saudi Arabia. *Pakistan Journal of Nutrition* 3, 344-347 (2004).
13. Özçelik, A. Ö., Sürücüoğlu, M. S. & Alkan, L. Survey on the nutrition knowledge level of Turkish physicians: Ankara as a sample. *Pakistan Journal of Nutrition* 6, 538-542 (2007).
14. Glanz, K. & Gilboy, M. B. Physicians, preventive care, and applied nutrition: selected literature. *Academic Medicine* 67, 776-781 (1992).
15. Glanz, K., Tziraki, C., Albright, C. L. & Fernandes, J. Nutrition assessment and counseling practices. *Journal of general internal medicine* 10, 89-92 (1995).
16. Mann, K. V. & Wayne Putnam, R. Physicians' perceptions of their role in cardiovascular risk reduction. *Preventive medicine* 18, 45-58 (1989).
17. Shea, S., Basch, C. E. & Zybert, P. Correlates of internists' practices in caring for patients with elevated serum cholesterol. *American Journal of Health Promotion* 4, 421-428 (1990).
18. Price, J. H., Desmond, S. M., Krol, R., Snyder, F. & O'Connell, J. K. Family practice physicians' beliefs, attitudes, and practices regarding obesity. *American journal of preventive medicine* 3, 339-345 (1986).
19. Hiddink, G., Hautvast, J., Van Woerkum, C., Fieren, C. & Van't Hof, M. Nutrition guidance by primary-care physicians: perceived barriers and low involvement. *European journal of clinical nutrition* 49, 842-851 (1995).
20. Hølund, U. *et al.* Importance of diet and sex in prevention of coronary artery disease, cancer, osteoporosis, and overweight or underweight: a study of attitudes and practices of Danish primary care physicians. *The American journal of clinical nutrition* 65, 2004S-2006S (1997).
21. Hiddink, G., Hautvast, J., Van Woerkum, C., Fieren, C. & Van't Hof, M. Consumers' expectations about nutrition guidance: the importance of primary care physicians. *The American journal of clinical nutrition* 65, 1974S-1979S (1997).
22. Far, k. B., Yousefi, A. & Tabatabaei, M. Nutrition knowledge, attitude, practice among health staff during pregnancy in Shiraz. *pazhohesh* 5, 290-293(persian) (2000).