Original Article

Dietary Assessment and Food Intake In Elderly Individuals Attending Public Health Centers In Urban Areas of Baghdad City In Iraq .

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Summary:

Background: The population composition in all countries is changing very rapidly, with the result that there will now be Increasing numbers of elderly in all communities and in all countries of the world .Age-related changes in body habits, and disease and medication-related interactions can affect the nutritional requirements of elderly persons. This can further compounded by difficulties that older persons experience in accessing grocery stores and in cooking healthy food Many older persons relay on the convenience of buying processed foods or ordering fast food that can contribute to both obesity and deficiencies in essential nutritional requirements . The diagnosis of nutritional deficiency states in elderly people is made more difficult by the usual symptoms and signs being masked by diseases.

Objectives: To assess the dietary and food intake in a sample of elderly subjects.

Patients and methods: A random sample of 184 elderly persons were included in the study 58.2% males and 41.7% females selected randomly from a list of public health centers in urban areas of Baghdad city , it was carried out during the period between the first of March and the end of August 2005.

Results: Highest proportion of the studied males and females aged 65-74years, the total number of males and females in this age group constitute (65.8%) of the studied sample. The highest frequency of elderly subjects with inadequate dietary intake was observed in vitamin B12 (59.2%) .The frequency of inadequate dietary intake was higher among elderly females than that in males for energy 28.6%, iron 18.2%,vitamin C 54.5%, vitamin B1262.3%, while it was higher among elderly males for protein 13.1%. It was found that high proportion of the studied sample had mean food daily intake less than the recommended mean values for milk 98.4% , vegetables 97.3% , fruits 96.7% , fish and sea food 95.1% meat poultry 70.7%, , legumes 59.3% , egg and products 57.6% , while 88% of them had high recommended mean food daily intake of cereals. The mean ± SD of BMI of elderly subjects of present study was 27.6 ± 4.8 .

Conclusion: The mean food daily intake of milk , meat/poultry/fish ,vegetables and fruits are deficient in a high proportion of the studied elderly subjects .Acceptable percentage of the studied sample had high mean food daily intake of cereals .The frequency of inadequate dietary intake was higher for energy , iron ,vitamin C, vitamin B12 in the study sample .

Key words : Elderly diet ,Geriatric dietary intake ,Geriatric food intake.

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Introduction

The population composition in all countries is changing very rapidly, with the result that there will now be increasing numbers of elderly in all communities and in all countries of the world (`1).The explanation for the decline found in death rates is improved nutritional status, better social and economic conditions and the major public health reforms of clean water and sewage disposal (1),(2) . Most developing countries in the world have already realized the social, economic and health implications of the demographic transition commonly known as ((The graying of nations)) (2). Older persons currently represent around 20% of the total population and the proportion is expected to be increased to 29% by the year 2025 (2). The united nation estimates that, the proportion of people over 65 years of age living in the countries of Eastern Mediterranean Region is approximately 3.6% (2).

However, there are difference in the proportion of the elderly population among the member states, ranging from a low 1.1% in Qatar and United Arab Emirate to high of 11% in Cyprus (3). In some countries of Western Europe the 60 years and over population presently makes 12-15% of the total population, by the year 2020, almost 25% of population will be in this age group (2). Regarding nutritional problems in elderly , the prevalence of obesity and protein-calorie under nutrition is significantly increased in older persons (4).Age-related changes in body habits, and disease and medication-related interactions can affect the nutritional requirements of elderly persons. This can further compounded by difficulties that older persons experience in accessing grocery stores and in cooking healthy food (1).Many older persons relay on the

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convenience of buying processed foods or ordering (fast food) that can contribute to both obesity and deficiencies in essential nutritional requirements (4).It has been reported that in USA, elderly persons, approximately 10-15% have difficulties in feeding themselves, and up to 50% of older persons admitted to acute care hospital are malnourished at the time of admission (5).The diagnosis of nutritional deficiency states in elderly people is made more difficult by the usual symptoms and signs being masked by diseases. Biochemical and hematological investigation can be helpful (6) .Older persons may not enjoy food as much as when they were young because of age-associated and disease-associated decrease in olfactory and taste perceptions. Many older persons are edentulous(40% of persons over the age of 70) or have significant periodontal disease that can affect the ability of older persons to chew (5),(7).Many older adults complaining of having a dry mouth, saliva is important in protecting the tissue of oral cavity and facilitating mastication, taste perception, and swallowing (5). Biopsy and autopsy data suggest that esophageal muscles become thicker with advancing age. As a result of these changes, esophageal motility and peristalsis frequently become impaired, and gastro-esophageal reflux disease occur in about 15% of older persons (8).Up to 70% of older individuals have evidence of atrophic gastritis and decrease in parietal cell mass, resulting in reduced gastric acid and intrinsic factor production.(9) These changes can result in reduced ability of older persons to extract vitamin B12 from salivary R-binding protein (require gastric acid) and cause impaired vitamin B12 , calcium and iron absorption (9), while stomach motility and emptying are minimally reduced with age, the ability of the stomach to relax and dilate to accept a food bolus is also impaired (8).Age and disease-associated changes of the small and large intestine includes variable amount of villous atrophy and loss of lymphoid tissue, this can cause a reduction in the absorption of iron, calcium, vitamin D and lactose. This is an explanation that many older persons are lactose intolerant (8) Other changes that occur with aging in large intestine include atrophy of the mucosa predisposing to diverticular disease and slowing colonic transit time often resulting in constipation (8). With advancing years, older persons are more likely to become impaired in their abilities to carry out normal activities of daily living because of an increase in disability. These impairments can lead to decreased ability to shop for food and cook (1). Cognitive impairment is also more likely to occur with advancing years and can result in a reduction in energy intake, reduced appetite and behavioral problems that can interfere with feeding (2).

Patients and methods:

Collection of data was carried out during the period between the 1st of March and the end of August 2005.The study sample was selected from elderly persons attending public health centers of urban areas in Baghdad city. Four public health centers were selected randomly from a list of public health centers in Baghdad city . The public health centers selected were Hey Al-Adel P.H.C from high socioeconomic , Al-Zahra'a P.H.C from low socioeconomic Al-Newab Street in Al- Karkh , Al-Mustanssirya P.H.C from high socioeconomic and Al-Obedie P.H.C from low socioeconomic in Al- Risafa. The sample of 184 elderly subjects included in this study 107males and 77 females .Direct interview was done with the included subjects using specially prepared questionnaire. The study was thoroughly explained to each elderly subject, so that the estimation of his dietary intake would be closest to his actual intake. Inclusion of an individual in the study depends on the following criteria .They were 65 years or more of age (2) ; and independent elderly not frail dependent elderly, freely living independent elderly who had not experienced major cognitive or physical impairment, (e.g.dementia, scoliosis,.. etc) . Exclusion criteria has history of debilitating disease like malignancy, renal failure, etc. and those with history of surgical operation (within the last 6 months). Demographic characteristics the age of the included subjects was taken from civilian personal record as the date of birth. Each old subject was interviewed directly and separately . The questionnaire form include (in addition to name, code number) the following information: Age, gender, educational level, current medical problems, Information about surgical history, Crowding index (CI) (an indicator for socio-economic status and it was calculated by dividing the number of household by the number of rooms in the house(10), Crowding index, educational level, provision of house care (indicators for social status of elderly subjects). Dietary assessment and food intake history , dietary intake was assessed using 24 hour recall method. The quantity of each food was estimated in portions of common household measures, a known weight or volume household measures and some weighed food items were used as a model. The nutrient content [calories, protein, iron, vitamin C and vitamin B_{12}] intake were calculated using food composition tables prepared by the Nutrition Research Institute food composition tables for Iraqi food 1979 and food composition tables for the near east (1)(11)(12). For analysis of intake (below the recommended levels) of energy 2020calories for males and 1835 calories for females and protein intake of 60gm for males and 58 gm for females , the recommended daily intakes stated by FAO were used as the standard recommended levels(13) . Analysis of iron of 10 mg for both males and females , vitamin B12 of 2.5 µg and vitamin C intake of 60-100 mg for both genders respectively ; were done using the recommended daily intake values stated by WHO (2) to identify subjects with intake below the recommended levels . The mean daily food intake in older subjects in gram/day of cereals>210g , fruits not juice 300g , vegetables 300-375g , milk products 450g , meat/ poultry 85g, fish and seafood 40g , legumes>30g , nuts and

seeds>10g , egg and products30g or 2-4 eggs/weak , were estimated by 3 days food recall method (two days and one weekend day analysis) the intake was evaluated according to the recommended mentioned value(1),(14).Recommended Dietary Allowance (RDA), which is described as the level of nutrient intake considered to be "adequate to meet the known needs of practically all healthy persons"(14). However, nutrient intakes below 70% of RDA are frequently considered to be the least RDA levels of nutrients below which put an individual at risk of clinical deficiency (1). Anthropometric measurements height and weight were measured for each individual, the weight was measured to the nearest 0.5kg without shoes and with a few clothes as possible. Beam balance weighing scale was used (healthometer–inc, bridged view, Illinois, USA/ UNICEF, capacity 160kg).The scale was checked every day before weighing by using a standard weight. Upon weighing, each individual should stand still without shoes in the center of the platform of the scale with the body weight evenly distributed between both feet. The height was measured without shoes to the nearest of 0.1cm using somatometer (France by stanlex MABO) with a horizontal head board that can be brought into contact with the upper most point of the head. He or she should stand on a flat surface with weight distributed evenly in both feet, heels together and the head positioned so that the line of vision is perpendicular to the body, the arm hanging freely by the sides, and the head, back, buttocks and heels are in contact with the vertical board with the knee fully extended. Two readings were taken of the previous measurement for each individual and their mean was recorded. For analysis, the height and weight measurement for each individual were used to calculate the body mass index BMI according to the following equation: Weight Kg divided by Height (meter)^2 . Calculated BMI for older subjects were compared with the cut off values done by Iftikhar A. et al., 2011 (6) as indicator of thinness and overweight . Statistical analysis data were translated into a computerized database analysis were done using SPSS version 10.5 computer software (Statistical Package for Social Sciences). Frequency distributions for selected variables were done first. The difference in mean of a continuous dependent variable assumed to be normally distributed was assessed by independent samples t-test. The association between 2 categorical variables was assessed by Chi-square test. An association was considered statistically significant if its P value was less than an α level of significance of 0.05.

Results :

The study sample included 184 elderly subjects, 107 (58.2%) of them were males and 77(41.7%) of them were females, male to female ratio was 1.4:1.Table

(1) shows age and gender distribution of the study sample, The mean +SD age of the studied sample was 71.9 ± 5.6 years. highest proportion of the studied males and females aged 65-74years, the total number of males and females in this age group constitute (65.8%) of the studied sample. Table (2) shows distribution of sociodemographic variables in the study sample , the higher proportion of the studied elderly subjects were illiterate 62.0% ,highest proportion of the studied elderly subjects mentioned that their house care were provided by their partner husband or wife 51.7%.The mean ±SD value for crowding index of the studied elderly subjects was 1.7±1.0 . Table (3) showed the frequency of elderly male and females whose dietary intakes were less than 2/3 of the recommended intake (RI) values. The highest frequency of elderly subjects with inadequate dietary intake was observed in vitamin B_{12} 59.2%. The frequency of inadequate dietary intake was higher among elderly females than that in males for energy 28.6%, iron 18.2%, vitamin C 54.5%, vitamin B_{12}62.3%, while it was higher among elderly males for protein 13.1%. No significant association in inadequate dietary intake between males and females ($p>0.05$). Table (4) showed distribution of the study sample according to recommended mean food daily intake. It was found that high proportion of the studied sample had mean food daily intake less than the recommended mean values for milk 98.4% , vegetables 97.3% , fruits 96.7% , fish and sea food 95.1% . meat/poultry 70.7%, , legumes 59.3% , egg and products 57.6% while 88% of them had the recommended and higher mean food daily intake of cereals.Table(5) showed the gender distribution of the study sample BMI , higher prevalence of normal BMI was noticed in males (31.8%) than that in females (16.9%), and higher prevalence of obesity was found in females (44.2%) than that in males (19.6%) . There is significant association between BMI and gender $P < 0.005$. The mean ± SD of BMI of elderly subjects of the present study was 27.6 ± 4.8 .

Table 1: Age and gender distribution of the study sample .

	Female		Male		Total	
Age in years	**N**	**%**	**N**	**%**	**N**	**%**
65-74	**59**	**76.6**	**62**	**57.9**	**121**	**65.8**
75-84	**18**	**23.4**	**41**	**38.3**	**59**	**32.1**
85-94	**0**	**0**	**4**	**3.7**	**4**	**2.2**
Total	**77**	**100**	**107**	**100**	**184**	**100**
Mean	**70.6**		**72.8**		**71.9**	
SD	**5.1**		**5.8**		**5.6**	

Table (2): Sociodemographic Characteristics of the Study sample

	N	%
Gender		
Female	77	41.8
Male	107	58.2
Total	184	100
Educational level		
Illiterate	114	62
Primary	17	9.2
Secondary	15	8.2
College	32	17.4
Higher degree	6	3.3
Total	184	100
House care provided by		
Siblings	86	46.7
Partner	95	51.7
Nobody	11	6
Others	3	1.6
Total	184	100
Socioeconomic status (Low Vs High)		
High	66	35.9
Low	118	64.1
Total	184	100

Table(3): Distribution of the study sample according to the frequency of dietary intake less than two thirds of RDA for selected nutritional items stratified by gender.

Variables	Female (n=77)		Male (n=107)			Total (n=184)	
	N	%	N	%	P (χ^2)	N	%
Total protein intake in gm/day	5	6.5	14	13.1	0.15[NS]	19	10.3
Total energy (calories) intake in Kcal/day	22	28.6	27	25.2	0.61[NS]	49	26.6
Total iron intake mg/day	14	18.2	10	9.3	0.08[NS]	24	13
Total Vitamin C intake in mg/day	42	54.5	53	49.5	0.5[NS]	95	51.6
Total Vitamin B12 in ug/day	48	62.3	61	57.0	0.47[NS]	109	59.2

p>0.05

Table(4): Distribution of the study sample according to recommended mean food daily intake.

	Cereals (g/day)	Fruits (g/day)	Vegetables (g/day)	Milk products (g/day)	Meat / poultry (g/day)	Fish and sea food (g/day)	Legumes (g/day)	Nuts and seeds (g/day)	Egg products (g/day)
less than recommended Mean food daily Intake									
N	22	178	179	181	130	175	109	181	106
%	11.9	96.7	97.3	98.4	70.7	95.1	59.3	98.4	57.6
* Recommended Mean food daily intake and more									
N	162	6	5	3	54	9	75	3	78
%	88	3.3	2.7	1.6	29.3	4.9	40.8	1.6	42.4
Total									
N	184	184	184	184	184	184	184	184	184
%	100	100	100	100	100	100	100	100	100

* Recommended mean food daily intake source (2), (4), (14).

Table 5: Body Mass Index of study sample by gender.

	Female		Male		Total	
BMI (Body mass index)	N	%	N	%	N	%
Thin (<18.5)	2	2.6	3.0	2.8	5	2.7
Normal (18.5-24.9)	13	16.9	34.0	31.8	47	25.5
Overweight (25-29.9)	28	36.4	49.0	45.8	77	41.8
Obese ≥ 30	34 q	44.2	21.0	19.6	55	29.9
Total	77	100	107	100	184	100

P (χ^2) = 0.004

Discussion :

The present study showed that 28.6% of females and 25.2% of males had inadequate intake of calories and 18.2% of females and 9.3% of males had inadequate intake of iron , 54.5% of females and 49.5% of males had inadequate intake of vitamin c and 62.3% of females and 57.0% of males had inadequate intake of vitamin B 12 .The HAPIEE cohort study in eastern Europe examined random sample of old men and women at baseline in selected urban centers from the year 2002-2005 found that energy intake in males is higher than energy intake in females which was lower than recommended dietary allowance(RDA) for elderly people but protein intake of elderly people was higher than recommended (15) , other workers (16) suggested that many older subjects intake of energy , vitamin C was low while daily intake iron was sufficient or above recommended dietary allowance ,other study in Japan (17)found that elderly people intake was higher than the current recommended dietary allowances for energy ,protein which was 44.8+/-7.7 kcal/kg/d and 1.80=/-0.35g/kg/d for men and 38.1=/-7.6kcal/kg/d and 1.51+/-.0.26 g/kg/d for women .Framingham heart study in USA, found that the intake

of energy ,iron and vitamin C was greater than RDA(18).on the other hand a cross sectional nutritional survey on a sample of elderly Malaysian aged 60 years and over found that the mean intake of energy and nutrient investigated (including iron and vitamin B 12)were below the Malaysian recommended dietary allowance except for protein and vitamin C(19) .other cross sectional analysis of nutritional survey data was conducted in healthy aged in USA (20) found adults who were 61 years or older had low micronutrient and energy intake compared with young adults .In a study on free living elderly Pakistanian men assessing nutrient intake according to WHO standard values (6) found that 72%of elderly had inadequate intake of protein 34%with inadequate iron intake ,47% inadequate vitamin C intake while the number of elderly individuals with inadequate energy intake 67.5% and low protein intake .The low mean daily food intake observed in our study among large proportion of the studied subjects and for many food items had been also reported in several studies, the cross sectional study (21) done in eight remote and semi-remote first nations reserves in north-western Ontario , found the mean number of servings consumed of fruits ,vegetables and dairy products were much lower than recommended ,while the mean daily meat and fish intake was more than twice that recommended and the greatest contributors to energy were breads. other study in India (22) (23) found the consumption of milk , green leafy vegetables , fruits ,and cereals was low in the studied elderly ,the author suggested that the various factors like poor dentations ,lake of availability and purchasing power may be responsible for low intake observed among the studied elderly subjects(7). Other study in Sri Lanka found that the daily intake of fruit, vegetables , dairy portions and meat were below national recommendation and 70% of the studied subjects exceeded the upper limit of recommendations for starch intake(24),the same finding in other study done in Beirut Lebanon were the mean consumption of fruits and vegetables ,fish, meat and poultry and dairy products were less than the recommended servings per week while high consumption of cereals mostly bread was found (25) . On the other hand, a study in Finland and UK (26) reported higher proportions of food intake in the studied elderly sample 80%consume milk,99.1%consme fruits ,97.6%consume dark green and orange vegetables ,96%consme meat/poultary,92.7%ate fish ,98.6%ate cereals (mostly bread) and72.9%ate other cereals .Higher proportion of food intake was also reported in Australian elderly subjects(14) and found that the studied elderly were eating fewer meat/ poultry and more vegetables , fruits and dairy products , however it was higher than RDA values ,the authors suggested that the significant decline in the proportion of raw food grocery purchases in Australia and the preference to healthier low fat food by the studied elderly may play a role in the results. previous reports in Iraq done on unsettled nomadic adults in 1980 reported that the intake of calories ,protein ,iron was adequate but the intake of ascorbic acid was lower than the recommended figures, the settled tribes of nomads could be more at risk nutritionally than the unsettled , bread was the major daily staple food(27).other report in Iraq revealed that the number of daily servings for fruits and/or vegetables which is less than 5 serving is 91.4% for both genders (31), the main food items consumed by Iraqi households constitute of bread (32).In the present study the total prevalence of obesity was 29.9% , 44.2% in females and 19.6% in males,these figures are higher than that reported in the national survey in Iraq 2006(38.2%and26.2% for females and male subsequently) (31), Denmark (12% for both genders) (28), India (7.5% of elderly females and 6.3% of elderly males)(23) and Pakistan (73.0%)(6) The reported figures are lower than that reported in Mexico (BMI values 62.3% were overweight , 73.6% in females and 26.4% in males)(29)(30).

Conclusion :

Nutrient intake below the two third recommended allowance are frequently considered to be inadequate .The proportion of low intake was generally greater in females than in males. The present study showed that more than 70% of the studied sample failed to take their recommended mean values for meat, fish and sea food ,milk ,fruits ,vegetables ,most of the studied elderly take more than the recommended mean values of cereals .

References :

1- WHO.Specific Nutritional Needs of Older Persons ,Aging and Nutrition : A growing Global Challenge2003. www. Nutrition@who.int.(internet).(IVSL)

2- WHO.Keep Fit For Life, Meeting the Nutritional Needs of Older Persons .ISBN9241562102,2002,pp:1-(IVSL)

3- WHO / EMRO. The Elderly in the Eastern Mediterranean region : An overview of aging . Exploding the Myths. International year of older persons. Alexandria, WHO Regional office of the Eastern Mediterranean region, 1999 .(IVSL)

4- Berg M. and Gordon L. J. Micronutrient deficiencies among older persons, New flash publication , Gastroentro. Clin. North. Am. ;2003, Vol. 9 (1) : 13–16 .

5- Adelman A. M. and Daly M. P. Nutritional status and Involuntary weight loss, ch.16, In: 20 common problems in geriatrics (International edition), Mc-Graw-Hill, 2001: 337-342.

6- Iftikhar Alam ,Anis Larbi ,Graham Pawelec and Parvez I. Paracha. Relationship between anthropometric variables and Nutrient Intake in Apparently healthy Male Elderly Individuals :A study From Pakistan.Nutr.J. 2011 ; 10 :11 . published on line 2011 October 12 doi : 101186/1475-2891-10-111.

7- Bradbury J. ,Thomason JM, Jepon NJ ,et al .Perceived Chewing Ability and Intake of Fruits and Vegetables .J Dent. Res .2008 ;878 (8) :720-5 .

8- Wilson M. G., Vaswani S., Liu D. The prevalence and causes of under nutrition in medical outpatients . Am. J. Med. 1998 ; 104 : 56.

9- Lipschitz D. A . The Effect of Age on Hematopoisis And the Work – Up of Anemia In The Elderly . Am. Soc. Hematol.;1999 : 504 – 509 .

10-Kaplan J.A. and Salonen J.T.. Socioeconomic Condition and ischemic heart disease during middle age . BMJ., 1990; 301: 1121-1123 .

11- FAO.Food Composition tables for the near east .ISBN92-5-601277-4,1988.

12- Food composition tables for local Iraqi foods .Nutrition Research Institute .Ministry of Health ,Iraq 1979.

13- FAO.Human Nutrition in the developing word FAO. ISSN1014-3181-Annex4.1997,Reference Nutrient Densities for selected nutrient pp:490.

14-Wahlqvist M.L. and Kouris-Blazos A. Requirments in Maturity and Aging .In: Wahlqvist M.L.(ed),Food and Nutrition :Australia and New Zealand (2nd ed).Sydney ,Allem and Unwin, 2002 :348.

15- Boylan S., Welch A., Pikhart H.,Kubinova R.,Bragina O., Simonova G.,et al.Dietary Habit in Three Central and Eastern EUROPEAN COUNTRIES : THE HAPIEE Study.BMC public health ,2009 Dec 1 ,pp:9-439.

16-Berner YN. ,Stern F. ,Polyak Z., Dror Y..Dietary Intake analysis in institutionalized elderly : a focus on nutrient density . J.Nutr.Health Aging .2002 ;6(4):237-42.

17- Watanabe R. , Hanamori K., kadoya H., Nishimuta M., Miyazaki H .Nutritional Intakes in Community –Dwelling Older Japanese Adults : High Intakes of Energy and Protein Based on High Consumption of Fish, Vegetables and Fruits Provide Sufficient Micronutrients .J Nutr. Sci. Vitamino , 2004 Jun, 50(3): 184-95.

18- Fleming D. ,Jacques P.E. , ,Dallal G.E. , Tucker K.L. , Wilson P.W. , Wood R.J .Dietary Determinants of Iron Stores in Free Living Elderly Population :The Framingham Heart Study. Am.J.Clin.Nutr.,1998;67:722-733.

19- Shahar S. , Earland J. ,Powers H.J. ,Rahman S.A. Nutritional Status of Rural Elderly Malays: Dietary and Biological Findings. Int. J. Vitam. Nutr. Res. 1999;69(4):277-84.

20- Robert SB , Hajduk CL , Howarth NC, Russell R, McCrory MA . Dietary Variety Predicts Low Body Mass Index and inadequate Macronutrient and Micronutrient Intakes in community- Dwelling Older Adults. J Gerontol. A. Biol. Sci. Med. Sci.,2005 ;60(5):613-21.

21- Sharma S. ,Cao X. , Gittelsahn J. ,Hol S. ,Ford E. ,Rosecrans A. ,Harris S. et al .Dietary intake and development of a quantitative food frequency questionnaire for life style intervention to reduce the risk of chronic diseases in Canadian first nations in North-Western Ontario .Public Health Nutrition 2008;11(8):831-40.

22- Srivastava M. ,Kapil U. ,Kumar V. ,Dey A.B. ,Nagarkar K M ,Sekaran G. .Knowlege Attitude and Practice regarding nutrition in patients attending geriatric clinic at AIMS .In :Kumar V.(ed) .Aging Indian Perspective and global scenario .New Delhi :All India Institute of medical sciences , 1996 ,pp:407-409 .

23- Wadhwa A., Sabharwal M., Sharma S. . Nutritional Status of Elderly Indian. J. Med. Res., Oct.1997 ; pp:106:340-8. .

24- Jayawardena R. ,Byrne NM , Soares MJ. Et al .Food Consumption of Srilankan adults :An Appraisal of Serving Characteristics .2012 ; Jul.12 :1-6.

25- Nasereddine L., Hwalla N.,Sibai A. ,Hamze M., Pareut Massin D.Food Compostion Patterns in an Adult Urban Population in Beirut Lebanon .Public Health Nutr. 2006 ; 9(2):194-203.

26- Roininen K., Fillion L., Kilcast D., Lahteenmaki L. .Exploring Difficult Textural Properties of Fruit and Vegetables for Elderly in Finland and United Kingdom .Journal of Food Quality and Preference 2004; vol.15 issue 6 ,pp.517-30.

27- Majeed R. Al-Ani .Diet and Dietary Habits of Nomads In Iraq . Ecology of Food and Nutrition1990; vol.9 issue 1 republished 31 Aug.2010.

28- Osler M. and Schroll M. . A Dietary Study Of Elderly In the City of Roskilde 1988/1989 (II) .A Nutritional risk assessment .Dan. Med. Bull. 2002;38(5) :410-3.

29- Sanchez –Garcia S. ,Garcia –Pena C. ,Duque-Lopez MX. et al .Anthropometric Measures and Nutritional Status in Elderly Population .BMC Public Health .2007 ; Jan ; 7 : 2 .

30- Velasquez –Alva MC , Irigoyen ME , Zepeda M , Sanchez VM, Garcia Cinero MP ,Castillo LM. Anthropometric measurements of a sixty year and older Mexican Urban group .J Nutr. Health Aging,2004;8(5);350-4.

31- Chronic Non-communicable Diseases Risk Factor Survey in Iraq, A Step Wise Approach ,World Health Organization ,Ministry of Planning and Development Cooperation , Central Organization for Statistics and Information, Ministry of Health ,Directorate of Public Health ,2006.p:45.

32- Ministry of Planning and Development Cooperation /WFP 2005. Food Security and
Vulnerability Analysis in Iraq 2005.