Nutrition knowledge, beliefs and dietary habits among elderly people in Nizwa, Oman: implications for policy

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المعارف والمعتقدات والعادات الغذائية لدى المسنين في نزوة، عُمان: آثار السياسة

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الخلاصة: تتطلب الاحتياجات التغذوية للمسنين اهتماماً خاصاً. وقد أجرى الباحثون مسحاً عرضياً للسكان يرتكز على المجتمع في ولاية نزوى، في عُمان، لدراسة المعارف والمعتقدات حول التغذية، والإبلاغ الذاتي عن العادات والنظم الغذائية لدى عينة من المسنين. وقد بلغت نسبة الاستجابة لمقابلة السكان 99.3٪ من أصل كامل العينة البالغ عددها 2041. وقد كان 45٪ من المسنين مفرطي الوزن أو بدناء. ووجد الباحثون أن المعارف عن التغذية بشكل إجمالي ضعيفة، مع اختلال التوازن التغذوي، ومستوى منخفض من الفعالية البدنية. وكان هناك اختلافات يعتد بها إحصائياً بين الجنسين لدى المسنين من حيث المعارف التغذوية وتناول السوائل، والحليب، والحلويات، واستخدام النظم الغذائية، ومعاناة التغيُّر في الشهية. وتنبِّه الدراسة إلى تغيير الاتجاه في الاستراتيجية الحالية لتعزيز الصحة لدى المسنّين.

ABSTRACT The nutritional needs of the ageing population require special attention. We undertook a cross-sectional, community-based, household survey in Nizwa *wilayat*, Oman to study nutrition-related knowledge and beliefs and self-reported dietary habits among a sample of elderly people. The response rate for the household interview was 99.3% from a total sample of 2041. About 45% of the elderly were overweight or obese. Overall we found poor knowledge of nutrition plus some nutritional imbalances and low levels of physical activity. Significant sex differences existed in elderly peoples' nutritional knowledge, consumption of fluids, milk and sweets, use of dietary regimens and experience of appetite change. The findings warrant reorientation of the existing health promotion strategy for the elderly.

Connaissances et croyances en nutrition et habitudes alimentaires chez des personnes âgées à Nizwa (Oman) : répercussions sur les politiques

RÉSUMÉ Une attention particulière doit être portée aux besoins nutritionnels de la population des personnes âgées. Nous avons réalisé une étude transversale communautaire auprès des ménages de la *wilaya* de Nizwa (Oman) afin d'étudier les connaissances et croyances en termes de nutrition et les habitudes alimentaires autodéclarées dans un échantillon de personnes âgées. Le taux de réponse des ménages à l'étude a été de 99,3 % pour un échantillon total de 2 041 sujets. Près de 45 % des personnes âgées souffraient de surcharge pondérale ou d'obésité. Dans l'ensemble, les résultats montrent que les personnes âgées avaient de faibles connaissances en nutrition, qu'elles présentaient des déséquilibres alimentaires et qu'elles pratiquaient peu d'activité physique. Des différences significatives liées au sexe ont été observées en termes de connaissances en nutrition, de consommation de liquides, lait et sucreries, de recours aux régimes alimentaires et d'antécédents de modifications de l'appétit. Les résultats justifient une réorientation de la stratégie existante de promotion de la santé destinée aux personnes âgées.

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Introduction

The World Health Organization (WHO) has acknowledged that ageing and nutrition is a growing global challenge [1]. Modifying lifestyle factors such as diet can prevent, slow or reverse the onset of many of the chronic diseases associated with ageing. Identifying dietary patterns and specific dietary components that offer protection against chronic disease is important [2]. Perceptions of healthy eating and food group consumption practices of elderly men are largely unexplored [3].

The Food Habits in Later Life project of the International Union of Nutritional Sciences highlighted the value of rapid assessment procedures for developing food-based dietary guidelines for their aged members [4]. Elderly patients with a compromised nutritional status increase the burden on the existing health care infrastructure. The inpatient burden of elderly people in Oman is around 10% [5].

This study was undertaken to assess nutrition-related knowledge and beliefs and self-reported dietary habits among a sample of elderly Omanis and to determine sex differences in their responses. It was hoped that the findings would be utilized for developing health promotion policy.

Methods

A cross-sectional, community-based, household survey of the profile and needs of non-institutionalized elderly Omanis aged 60 years and above was conducted in the Nizwa *wilayat*, Al Dakhliya region of Oman in 2005.

Sample

Our sampling frame was the 2003 census data [6]. The Ministry of National Economy provided a list of households where elderly people were resident, together with the corresponding enumeration area maps for the Nizwa *wilayat*. Supervisors were involved in updating the maps and numbering the houses. The elderly who had moved to a different location in the *wilayat* and were residing in houses newly built since the census were also traced and recruited. Inhabitants of Jabal Akhdar and remote scattered houses were excluded due to logistic constraints. After updating the list of elderly people we found a total of 1508 houses inhabited by elderly people, which yielded 2041 elderly people. The response rate for the household interview was 99.3% (n = 2027), while for the clinical examination and investigation it was 80.8% (n = 1650).

Data collection

After approval by the research ethics committee of the Ministry of Health, Oman, informed consent was obtained from the participants. A structured questionnaire to assess 9 different domains of health relevant to the elderly in Oman was constructed, based on a literature review and expert opinion; only the nutrition domain is reported in this paper. The data were collected by personal interviews at home. The interviewers were health educators from the Ministry of Health and volunteers from community support groups who received 6 days of standardized intensive training. A second questionnaire to collect data from clinical examinations and investigations was completed by a medical doctor in the Nizwa community research centre. After the pilot study, data collection was conducted between June and August 2005.

The questionnaire collected basic demographic data about respondents: age, sex, marital status, education, occupation, personal income and whether living with their family. The next section assessed respondents' knowledge and beliefs about nutrition: whether the quality and quantity of food should change in older ages, what types of food to eat and whether certain food can protect or control diseases in later life. A section on dietary habits asked about number of meals eaten, whether their appetite had changed, the quantities of various food groups that they consumed and whether they consumed any special diets, took vitamin/mineral supplements, etc.

Currently there are no uniform food guidelines for the Arab region or portion size and food composition tables to suit the Arab food habits and culture [7]. For our nutrition analysis we took account of the traditional regional [8] and local dietary habits to establish appropriate frequencies of dietary intakes. In the questionnaire the responses were assessed as adequate/inadequate intake. Except for fluids, information about portion sizes was not collected. Adequate consumption of fish/meat/chicken (animal proteins) was defined as consumption > 3 times per week and inadequate as ≤ 3 times per week. The same criteria were applied for vegetables, fruits and cereals. Intake of milk and milk products ≤ 3 times per week was classified as less than adequate while 4+ times per week was adequate. Milk and milk products were classified as full-fat if 2 or more items out of milk, yoghurt and *laban* were reported to be full-fat. Information about portion sizes was not collected. Fluid consumption per day (water, milk, *laban*, fruit juices and other drinks) ≤ 1500 mL per day (measured by number of oral dehydration solution glasses) was considered inadequate.

We also assessed levels of physical activity based on daily chores and walking, with the cut-off set at 30 minutes exercise per day [9]. Body mass index was calculated and underweight, overweight and obesity were defined based on WHO criteria [10].

Analysis

Data entry was done in the region with *Epi-Info*, version 3.1, and data management and analysis was done using *SPSS*, version 9.0. Descriptive analysis of the nutrition-related data was done. Chi-squared tests of significance, with

$P < 0.05$ as significant, were used to assess sex differences for the relevant variables.

Results

Background characteristics

The sample of respondents consisted of 51.6% females and 48.4% males (Table 1). There were significantly more women in the 60–69 years age group (59.7% of women, 53.8% of men) and fewer in the 70–79 years group (24.2% of women, 31.3% of men), while the sex distribution of the very elderly (age 80+ years) was similar. A majority of participants resided in urban areas. The illiteracy rate among the women was 95.3%, with only 3.9% having studied up to semi-primary level; the corresponding proportions for men were 67.6% and 25.8% respectively. Nearly 7% of men had primary level of education or above, compared with less than 1% of women ($P < 0.001$). Among men, 91.3% were married and 5.3% widowed compared with 45.1% and 48.7% respectively among women ($P < 0.001$).

Occupational status showed that 16.7% of elderly men were working while 98.9% of the women were housewives. Almost three-quarters of women (72.0%) but only one-fifth of men (20.8%) had no personal income. Overall 21.0% earned < 100 Omani rials (OR) per month while 26.0% earned 100–199 OR. The difference in income levels between males and females was significant ($P < 0.001$). Almost all the men (97.3%) had been resident with the same family for the previous 5 years compared with 93.8% of women ($P < 0.001$).

There was a higher rate of obesity in women (15.7%) than men (10.5%) ($P = 0.02$) and 31.5% of the total sample was overweight with 7.6% being underweight. Of the total, 49.4% were not physically active, while among the active respondents, more males were physically active than women (21.6% of men versus 14.3% of women took ≥ 30 min exercise/day) ($P < 0.001$).

Nutrition knowledge and beliefs

In the assessment of nutrition knowledge and beliefs (Table 2), 43.0% of the total sample believed that the quality of nutrition should change with age but only 17.2% believed that the quantity should change, with no significant difference between the sexes. Only 23.5% accepted that they should include some specific types of food with advancing age, while about 26.7% were not certain about this. There was a significant sex difference on this issue, with a higher proportion of men giving affirmative answers. With respect to moderating the consumption of specific food types with age, significantly fewer women gave a negative reply than males, and more women were unsure ($P = 0.022$). However, a slightly higher proportion of women replied positively to the questions about the need to reduce the intake of sweets/sugar, fat and salt.

Respondents' detailed knowledge about the value of milk and dietary fibreswas quite poor, with 12.3% aware of the value of milk in protecting against osteoporosis while only 1.7% knew it as a rich source of calcium. There were significant sex differences, with fewer women than men having knowledge about milk for osteoporosis prevention (10.1% versus 14.6%) and as a source of calcium (1.1% and 2.4%). Only 7.3% of the total had heard about dietary fibre and, of those, less than 3% knew its importance in daily diet. A majority of the elderly did not know which foods were rich in dietary fibre. Significantly fewer women than men (29.4% versus 31.5%) ($P = 0.004$) were aware that changes in dietary habits could help in prevention and control of health problems. Only 20.4% of the total sample were aware that this could help in hypertension and diabetes, while less than 5% were knowledgeable about the role of dietary habits in other specific illnesses.

Nutrition practices

The practice of consuming 3 meals per day was reported by 91.4% of the respondents (Table 3). One-third of women (33.5%) compared with 27.3% of men had noticed a change in their appetite ($P = 0.003$). The most common reason was sickness (17.7%), although 12.5% said they had lost their appetite for no reason, with women mentioning these factors more than men. Taking medicines was attributed as a reason by 2.5% of the elderly.

Respondents' self-reported levels of consumption showed that only 16.4% consumed adequate amounts of milk and there was a significant difference between the sexes as regards consumption of milk and milk products, with significantly fewer women than men (14.1% versus 18.8%) consuming adequate amounts ($P = 0.004$). Full-fat dairy products were the preference of 38.8% of the sample. Of the total respondents 59.0% consumed adequate amounts of fish/meat/chicken, 83.4% adequate amounts of cereals and 85.0% adequate amounts of fruits. Vegetable intake, however, was inadequate for 88.6% of the total. Proportionately more women did not consume any type of sweets ($P = 0.01$) but 58.4% of the total sample had a sweet intake 1–3 times a week. There was no sex difference in the adequacy of consumption of fish/meat/chicken, cereals, vegetables or fruits.

One-fifth of the sample (19.4%) took additional salt in their diet and 9.3% took vitamin/mineral supplements. Women had significantly lower fluid intake per day ($P < 0.001$). More women followed a diet regimen ($P < 0.001$), with 14.0% having fat and cholesterol restriction and around 10% having salt and sugar restrictions.

Table 1 Distribution of background characteristics of elderly respondents by sex

Characteristic	Males (*n* = 982)		Females (*n* = 1045)		Total	*P*-value
	No.	%	No.	%	%	
Residence						
Urban	877	89.3	935	89.5	89.4	> 0.05
Rural	105	10.7	110	10.5	10.6	
Age groups (years)						
60–69	528	53.8	624	59.7	56.8	0.005
70–79	307	31.3	253	24.2	27.6	
80–89	104	10.6	119	11.4	11.0	
≥ 90	43	4.4	49	4.7	4.5	
Education						
Illiterate	662	67.6	996	95.3	81.9	< 0.001
Semi primary	253	25.8	41	3.9	14.5	
Primary & above	65	6.6	8	0.8	3.6	
Marital status						
Never married	14	1.4	13	1.2	1.3	< 0.001
Married	896	91.3	471	45.1	67.5	
Widowed	52	5.3	509	48.7	27.7	
Divorced	19	1.9	52	5.0	3.5	
Work status						
Working	164	16.7	11	1.1	8.6	n/a
Not working	818	83.3	0	0.0	40.4	
Housewife	0	0.0	1034	98.9	51.0	
Personal income (OR/month)						
0	204	20.8	752	72.0	47.2	< 0.001
< 100	205	20.9	221	21.1	21.0	
100–199	468	47.7	60	5.7	26.0	
200–299	63	6.4	4	0.4	3.3	
300–399	15	1.5	3	0.3	0.9	
400+	27	2.7	5	0.5	1.6	
Living with same family for last 5 years						
Yes	955	97.3	980	93.8	95.5	< 0.001
No	27	2.7	65	6.2	4.5	
BMI[a]						
Underweight	55	7.8	53	7.4	7.6	0.020
Normal	358	50.7	325	45.1	47.9	
Overweight	219	31.0	230	31.9	31.5	
Obese	74	10.5	113	15.7	13.1	
Physical activity (min/day)						
0	435	44.3	567	54.3	49.4	< 0.001
< 30	335	34.1	329	31.5	32.8	
≥ 30	212	21.6	149	14.3	17.8	

[a]Some data missing.
BMI = body mass index.
OR = Omani rials.
n/a = not applicable.

Table 2 Dietary knowledge and beliefs of the elderly respondents by sex

Dietary knowledge/belief	Males		Females		Total	*P*-value (males vs females)
	No.	%	No.	%	%	
Agree quality of nutrition should change with age	424/966	43.9	434/1030	42.1	43.0	0.617
Agree quantity of nutrition should change with age	177/957	18.5	163/1019	16.0	17.2	0.216
Type of foods to eat at older ages	(*n* = 980)		(*n* = 1043)			
Certain types of food should be eaten						< 0.001
Yes	248	25.3	228	21.9	23.5	
No	511	52.1	496	47.6	49.8	
Don't know	221	22.6	319	30.6	26.7	
Types of food to eat:						
Vegetables	107	10.9	113	10.8	10.9	0.952
Fruits	77	7.9	75	7.2	7.5	0.570
Milk	63	6.5	71	6.8	6.6	0.732
Water	87	8.9	83	7.9	8.4	0.456
Moderation of diet at older ages	(*n* = 969)		(*n* = 1031)			
Certain types of food should be moderated						
Yes	387	39.9	428	41.5	40.8	0.022
No	375	38.7	343	33.3	35.9	
Don't know	207	21.4	260	25.2	23.4	
Types of food to moderate:						
Protein	37	3.8	33	3.2	3.5	0.453
Cereals/starch	47	4.9	34	3.3	4.1	0.150
Sweets/sugar	206	21.3	239	23.2	22.3	0.302
Fat	210	21.7	238	23.1	22.4	0.449
Milk	6	0.6	11	1.1	0.9	0.276
Eggs/liver/brain	10	1.0	4	0.4	0.7	0.084
Salt	115	11.9	182	17.7	14.9	0.000
Fruits/vegetables	10	1.0	5	0.5	0.8	0.156
Water	1	0.1	0	0.0	0.0	0.302
Benefits of milk at older ages	(*n* = 980)		(*n* = 1043)			
Rich in calcium	24	2.4	11	1.1	1.7	0.016
Rich in vitamin D	11	1.1	7	0.7	0.9	0.280
Offers protection from osteoporosis	143	14.6	105	10.1	12.3	0.002
Rich in protein	7	0.7	5	0.5	0.6	0.492
Helps to prevent constipation	35	3.6	38	3.6	3.6	0.931
Benefits of dietary fibre at older ages	(*n* = 978)		(*n* = 1042)			
Heard about dietary fibre	80	8.2	67	6.4	7.3	0.130
Benefits of dietary fibre:						
Regulates intestinal movements	36	3.7	28	2.7	3.2	0.203
Relieves constipation	17	1.7	10	0.9	1.3	
Other uses	27	2.8	26	2.5	2.6	0.709
Foods rich in dietary fibres:						
Fruits	14	1.4	11	1.0	1.2	0.445
Vegetables	42	4.3	26	2.5	3.3	0.025
Whole cereals	18	1.8	24	2.3	2.1	0.466
Plant proteins	2	0.2	2	0.2	0.2	0.949

Table 2 Dietary knowledge and beliefs of the elderly respondents by sex (*concluded*)

Dietary knowledge/belief	Males		Females		Total	*P*-value (males vs females)
	No.	%	No.	%	%	
Changes in dietary habits at older ages	(*n* = 980)		(*n* = 1043)			
Changes in diet can protect and control health problems						
Yes	309	31.5	307	29.4	30.4	0.004
No	355	36.2	328	31.4	33.8	
Don't know	316	32.2	408	39.1	35.8	
Diseases that can be controlled by diet:						
Hypertension	194	19.8	218	20.9	20.4	0.537
Diabetes	200	20.4	203	19.5	19.9	0.595
Hyperlipidaemia	57	5.8	39	3.7	4.7	0.028
Coronary heart disease	35	3.6	27	2.6	3.1	0.200
Obesity	36	3.7	23	2.2	2.9	0.050
Anaemia	13	1.3	10	0.9	1.1	0.436
Gastric/duodenal problems	8	0.8	8	0.8	0.8	0.900

Discussion

This was the first study of nutrition in the elderly conducted in Oman. The high illiteracy rate of respondents can be explained by the fact that all the respondents had reached adulthood before the country's recent renaissance which began in 1970, at a time when few Omanis had access to education. Females in the Arab world had less opportunity for formal education at that time and this accounts for the significant sex differences. The same was true for work opportunities and hence the income of the elderly respondents differed significantly between the sexes.

Changes in lifestyle and socioeconomic status have led to more sedentary lifestyles in Oman and levels of physical activity have decreased sharply in most Arab countries [11]. Half our overall sample took no physical activity and women spent significantly less time in physical activity than men, as most have domestic helpers for daily chores and there is little awareness of the value of walking as exercise. This, along with higher rates of multiparity [11], accounts for the higher prevalence of obesity in women than men (15.7% versus 10.5%). Similar findings on obesity have been noted in elderly women in Egypt [8].

Although the proportion of females among the elderly is generally higher due to their higher survival rates, in this interior region of Al Dakhliya, we found a lower proportion of women in the 70–79 years age range and similar proportions in the 80+ years age group. A possible reason could be unavailable or incorrect birth records, leading to misclassification of age in some cases. There are fewer cultural and social barriers to multiple marriage and remarriage by men, which accounts for a significantly higher proportion of men being married at the time of this study, while a higher percentage of women were widowed.

The elderly in our study lacked knowledge about the benefits of nutritional foods and a majority of men and women believed that there was no need to change the quantity and quality of nutrition with increasing age. A European study reported that 86% of elderly people believed that they did not need to change their eating habits as they already ate healthily [12]. However, researchers in Assuit governorate in Upper Egypt reported otherwise. They found that 44.0% of men and 63.4% of women in rural settings and 77.3% and 63.8% respectively in urban settings believed that diet should differ with age, either decreasing the amount of food in general or restricting certain types of food [8].

Older people residing outside institutions eat reasonably well [13]. There is ample availability of foodstuff from different parts of the world in Oman. A majority of the elderly in this study lived with their family, and there is a tradition in Arab countries of caring for the elderly. Although there were significant differences between men and women in education and income level and the proportion living with their families, this was not reflected in differences in dietary intake of meat, cereals, fruits and sweets or in the frequency of meals per day Energy intakes fall with advancing age, but average protein intakes remain adequate [13]. High energy intake over decades leads to overweight in both sexes [14]. There is a shift in the Arab world from consuming traditional foods to more "fast-foods", which are characterized by high fat, cholesterol and sodium and low fibre [11]. A high proportion of our sample were overweight or obese. The impact of the promotional activities of the regional health care system and of the WHO Nizwa Healthy City project

Table 3 Dietary habits of the elderly respondents by sex

Dietary habit	Males (*n* = 982)		Females (*n* = 1045)		Total	*P*-value
	No.	%	No.	%	%	
Meals eaten (per day)						
1	15	1.5	11	1.0	1.3	NS
2	67	6.8	81	7.8	7.3	
3	900	91.6	953	91.2	91.4	
Noticed change in appetite						
Yes	265	27.3	348	33.5	30.5	0.003
Reasons for change in appetite						
Sickness	147	15.1	209	20.1	17.7	
Taking medicine	26	2.7	24	2.3	2.5	
Death of someone close	3	0.3	13	1.3	0.8	
No apparent reason	116	11.9	135	13.0	12.5	
Adequate consumption of foods(per week						
Fish/meat/chicken	559	58.4	611	59.6	59.0	NS
Cereals	797	83.0	853	83.7	83.4	NS
Vegetables	104	10.9	119	11.8	11.4	NS
Fruits	810	83.7	885	86.2	85.0	NS
Consumption of sweets (times per week)						
0	315	38.4	393	44.6	41.6	0.01
1–3	506	61.6	489	55.4	58.4	
Consumption of extra salt in diet	194	19.9	197	19.0	19.4	NS
Consumption of fluids[a] (mL per day)						
Inadequate	228	23.3	357	34.4	29.0	< 0.001
Adequate	749	76.7	680	65.6	71.0	
Consumption of milk & milk products (times per week)						
Inadequate	796	81.2	896	85.9	83.6	0.004
Adequate	184	18.8	147	14.1	16.4	
Types of milk & milk products consumed						
Low fat/skimmed	534	59.1	591	63.2	61.2	NS
Full fat	370	40.9	344	36.8	38.8	
Take vitamin/mineral supplements	83	8.6	104	10.0	9.3	NS
Follow diet regimen	325	33.3	432	41.6	37.6	< 0.001
Restrict fat and cholesterol	123	12.6	160	15.4	14.0	
Restrict sugar	94	9.6	125	12.0	10.9	
Restrict salt	84	8.6	130	12.5	10.6	
Eat more iron-containing foods	6	0.6	0	0.0	0.3	
Eat more fibre	7	0.7	7	0.7	0.7	

Totals do not add up to sample size due to missing data; [a]water, milk, laban, juices, other drinks; NS = not significant.

on nutrition seems to work positively only for the small proportion of the population who are aware of the health promotion programmes for hypertension and diabetes.

A high proportion of older adults in England had little basic nutrition knowledge and this was a barrier to healthier eating. Knowledge of associations between diet and diseases was particularly poor; 90% of subjects were unaware of the benefits of high fruit and vegetable consumption [15]. We found no sex differences in consumption of fruits and vegetables but the lack of knowledge related to fruits and vegetables was reflected in poor consumption of vegetables but not fruits in our study. We noted a significant sex difference for knowledge about the need to eat specific types of food, the need for moderation

of certain types of food and whether changes in dietary habits can protect and control health problems at older ages. In another study men were found to have poorer knowledge about nutrition than women [16], whereas in our sample women had poorer knowledge. In a study related to fat intake from meat, meat products, dairy products and fried foods, women had higher nutrition knowledge scores and more negative views of fatty foods than did men [17]. More of our women had negative views about specific items such as sweets, fat and salt consumption. However, when it came to actual consumption, only sweets were significantly less frequently consumed by women, the other items being consumed equally by both sexes. Although women in our survey knew about the need to moderate their intake of fatty foods, they still consumed these foods, perhaps due to the existing belief systems and attitudes towards such food.

Nutritional knowledge about dairy products has been shown to be a better predictor of the type of milk consumed (e.g. lower fat milk to reduce fat intake) than the frequency of milk consumption [18]. We noted similar findings. Knowledge about the nutritional value of milk was very poor and women were less informed than men. Overall only 16.4% of the total sample, and significantly fewer women than men, consumed adequate amounts of milk. This shows the poor impact on this age group of the ongoing women's health programme in Oman. Among those who consumed milk products, 40% used full-fat milk and milk products, which again reflects traditional habits.

In the Ageing Nutrition project in Europe a comparative analysis of 36 studies showed that energy intake was too high, especially in some of the "younger old" and seemed not to be adjusted to the energy expenditure, whereas it was considerably lower than recommended in some very old seniors in some countries [19]. We cannot comment on the age difference, but energy intake was higher in our sample, which may be inferred from the number of meals per day, the adequacy of food consumption (meat, cereals, sweets and fruits) and the finding that only 7.5% of the total sample was underweight. The prevalence of obesity and overweight were also found to be higher than underweight in elderly men and women in Egypt [8]. In contrast to our findings, undernutrition in older people is considered to be a significant public health issue in the UK [20]. "Willingness to eat" plays a central role with regard to appetite among the elderly [21]. In our study decreased appetite noticed by the elderly people themselves was mainly attributed to unexplained factors and sometimes illness and use of medications.

Sex differences were found in food choices and energy and nutrient intakes in older British people, especially those aged 65–79 years [22]. Meal frequency has been found to increase in older people of both sexes, especially men [14]. Women have more regular consumption of fruits and vegetables [23], milk and diary products and vitamin supplements [14]. Almost all types of meat, eggs, and vegetables are preferred by men and their energy intake also tends to be higher. In both sexes, fat has been shown to represent a higher ratio of energy intake (39%) than recommended [14]. In our study the dietary consumption patterns of men and women differed significantly only for milk and milk products, sweets and fluids, with women consuming less of these.

The major limitations of our study were that we did not use a validated questionnaire. Also we could not quantify the food consumption due to the unavailability of food consumption tables for Oman [24].

Intervention trials demonstrate that there are worthwhile health advantages for older people in changing their risk factors—e.g. weight reduction, sodium restriction, saturated fat reduction—to make their later years healthier, more active and more independent [25]. Effective intervention is required for improving knowledge among the elderly in our study. Dietary advice should be based on elderly women's food preferences and habitual foods [26]. It is important to inform the elderly about known relations between food and disease. This is especially important for women, who have higher levels of obesity.

The WHO Regional Office for the Eastern Mediterranean has addressed the issue of health of the elderly for over a decade and has identified a need for appropriate food and nutrition care for the elderly. However, a draft of the proposed model national policy for the elderly by EMRO does not explicitly mention the nutrition component [27]. Similarly, the recommendations of the Third Arab Conference on Nutrition 2007 resulted in the Abu Dhabi Declaration to Promote Healthy Nutrition in the Arab countries [7], but did not specifically address the growing global challenge of ageing and nutrition.

Conclusions

Our findings that nearly 45% of elderly people in Nizwa were overweight or obese, and had poor knowledge of nutrition, along with nutritional imbalances and low levels of physical activity, warrants reorientation of the existing health promotion strategy for the elderly. The significant sex differences in nutritional knowledge need to be addressed. The above findings need to be incorporated into the awareness and education programme of the national strategy for "Active ageing and self care" proposed by the Ministry of Health and the Ministry of Social Welfare. A further detailed study is necessary in order to prepare a micronutrient supplementation programme for vulnerable groups including the elderly.

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