

## Oral health and nutritional status of the free-living elderly in Peshawar, Pakistan

Ifrikhar Alam, BSc, MSc, Fawad Bangash, FSc, BDS.

Nutritional status and nutrient intake are closely related to oral health.<sup>1</sup> Unfortunately, elderly individuals are often victims of poor oral health,<sup>1-3</sup> and Pakistan is no exception. On literature review, we were unable to find previous studies documenting the dental health of the elderly in Pakistan. We therefore, undertook a small cross-sectional study to investigate the nutritional and oral health status of this age group, and also to ascertain any relationship between oral health, teeth cleaning, and nutritional status.

Here, we report the nutritional status and oral health of a total of 130 free-living elderly male individuals of age 60 and above living in Peshawar, North West Frontier Province of Pakistan. Elderly males who attended a dental clinic in Peshawar between April to July 2008 were the subjects of the present study. An informed written consent declaring their willingness to participate in the study was obtained from all the participants. The method of convenient sampling was applied for sample selection. The inclusion criteria were set to include otherwise medically fit subjects with no evident chronic disease (as assessed by their self-reported medical fitness history), non-smokers and with no drug addiction. Female subjects seldom visit private clinics due to cultural constraints of the area and therefore, they were not included in the present study within the existing settings and provisions. The nutritional status of the subjects was assessed by simple anthropometric measurements including weight (Kg), height (cm) and body mass index: BMI=weight (Kg)/height (m<sup>2</sup>). Weight was measured to the nearest 100 g with the subject wearing light clothing. Height was measured to the nearest 0.1 cm using a microtoise® (Francis Inc., Lahore, Pakistan) attached to a wall. Each subject stood on a horizontal platform without shoes and with heels together and head in the Frankfort plane. Dietary data were collected using the 24-hour dietary recall method. For this purpose, a questionnaire was developed, validated and pre-tested by collecting data from 10 individuals not included in the present study. The respondents were asked what they had eaten over the previous 24 hour period from breakfast until their last meal at night just before going to sleep, including solid food as well as beverages, but excluding medicine, and so forth. The amount of each food consumed was used to calculate the mean amount of nutrients taken. For dental health, every subject was examined by a single dental physician in the clinic. Given the limitations of time and resources available,

no radiographic investigations were performed. A tooth was registered if  $\geq 2$  mm were present above the gingival margin. Carious defects (DT), missing (MT) and filling teeth (FT) were diagnosed. The DMFT scores were calculated in accordance with the WHO guidelines.<sup>4</sup> A patient self-assessment form for chewing problems and bleeding gums was developed and piloted before the start of the study. Chewing problems were defined as the inability to chew food easily and without pain or difficulties. Participants were asked whether they had any difficulties in chewing and their responses were recorded as 'Yes' or 'No'. We did not collect data on specific causes of chewing problems. However, the participants were asked whether they suffered from mouth dryness or if they observed difficulty in moving a food bolus in the mouth. Similarly, data on bleeding gums were obtained by asking the subjects questions like: Do your teeth bleed while cleaning or eating? In addition, physical assessment of the gums was performed to confirm the response of the subjects. The gums were checked for inflammation, pockets around the teeth, hypertrophy, discoloration, and gum hyperplasia. The subjects were also interviewed on their daily teeth cleaning/brushing practice. The teeth cleaning practices were defined as: 'clean regularly' if the participants brush their teeth 2-5 times or more in a day; 'clean seldom' if the participants brush their teeth  $\leq$  once a day. Based on their BMI values, subjects were grouped in 2 categories, namely, normal weight (NW; BMI=18.5-24.9) and underweight (UW; BMI = <18.5) according to WHO criteria.<sup>5</sup> The data were statistically analyzed using Graph-Pad Software (Version 5.0.). The descriptive statistics of the anthropometric data, results of DMFT score and DMT-components were provided (mean values, standard deviation). Student's t-test was used for statistical comparison and correlation analyses. A *p*-value of <0.05 was considered as statistically significant.

There were 74 (56.9%) NW and 56 (43.1%) UW elderly subjects. The results show most of the subjects were illiterate (76% UW, 43% NW) and economically dependent (81% UW, 53% NW). The elderly subjects of this study belonged to the low to middle socioeconomic segment of the community. The mean age, BMI, DMFT score, and DMFT-components of the study subjects are shown in Table 1. There was a significant (*p*=0.001) difference between the DMFT scores of NW and UW individuals. Table 2 shows the percentage of NW and UW elderly according to their general dental status and nutrient intake. Data on general teeth health status showed more elderly UW subjects with bleeding gums and chewing problems. The findings on nutrients intake showed NW subjects had significantly higher energy, protein, calcium, and vitamin C intake as compared

**Table 1** - Mean age (years), BMI, DMFT score, and DMFT-components of the normal weight (NW) and underweight (UW) elderly subjects.

Variables	NW	UW	P-value
Mean age in years	67.4 (5.7)	65.2 (6.3)	0.032
Mean BMI	23.5 (1.9)	16.1 (2.5)	0.001
<b>Mean DMFT and DMFT-components</b>			
DT	2.3 (0.21)	4.2 (1.21)	0.003
MT	9.3 (3.1)	19.1 (6.41)	0.001
FT	1.4 (0.23)	2.9 (0.27)	0.04
DMFT	13.0 (0.51)	26.2 (1.3)	0.001

BMI - body mass index, DT - decayed teeth, MT - missing teeth, FT - filled teeth, DMFT - decayed, missing, filled teeth

**Table 2** - Percent of normal weight (NW) and underweight (UW) elderly according to their general dental status and nutrient intake.

Variables	NW	UW	P-value
<b>Teeth health status</b>			
Bleeding gums	34	51	
Chewing problems	41	69	
<b>Nutrients intake % of RDA (sd)</b>			
Energy	79 (19.4)	56 (24.1)	0.001
Protein	56 (24.1)	41 (11.7)	0.001
Calcium	74 (23.5)	34 (17.2)	0.05
Vitamin C	81 (22.3)	42 (16.5)	0.002

RDA - recommended daily allowance, sd - standard deviation

to the UW elderly. There was an inverse correlation between BMI and DFMT score ( $r=-0.211$ ,  $p=0.001$ ). Data shows a significant inverse correlation between DMFT scores and nutrient intake, DMFT scores and energy ( $r=-0.201$ ,  $p=0.002$ ), DMFT scores and protein ( $r=-0.196$ ,  $p=0.001$ ), DMFT scores and calcium ( $r=-0.203$ ,  $p=0.001$ ) and DMFT scores and vitamin C ( $r=-0.191$ ,  $p=0.001$ ). The results on teeth cleaning practices show those who cleaned their teeth regularly (2-5 or more times a day) had relatively healthier oral health compared to those who cleaned their teeth very seldom ( $\leq$  once a day).

Malnutrition is highly prevalent in Pakistan.<sup>6</sup> There is no separate data on nutritional status of Pakistani elderly. The nutritional surveys conducted in the past, however, show very marginal nutritional status and high nutrient deficiencies in the general population. In this context of higher prevalence of malnutrition in Pakistan, it can be assumed that the elderly might have an even more impaired nutritional status. This fact necessitates investigation of the causes and contributing factors of malnutrition in elderly. The present pilot study documented nutritional and dental status of Pakistani elderly individuals. The study showed a substantial number of elderly with nutritional and dental problems. The correlation between BMI and DMFT score ( $r=-0.211$ ) was only slightly pronounced, but these results indicate that high DMFT score does have possible negative consequences. These findings are in close agreement with some recent studies,<sup>2,3</sup> in which it is shown that there is a negative relationship between nutritional status and dental problems. On literature review, we were unable to find any published data concerned with correlations between BMI (nutritional status) and DFMT score in Pakistani elderly subjects.

The present study also reported very poor dental hygiene practices in the UW elderly in particular. Poor oral hygiene is the most important risk factor in the development of periodontal diseases,<sup>4</sup> which

subsequently lead to poor nutritional status.<sup>2,3</sup> One very important question that may arise from the current study and needs to be answered is: does nutritional status and nutrient intake lead to poor dental health or is it the other way around? Unfortunately, our findings cannot differentiate between these 2 possibilities as we used a small pilot study with a cross-sectional design. Nevertheless, we did show an inverse relationship between BMI and the DFMT score and nutrient intake and DFMT score. A person's ability to eat can be affected by compromised dentition-decayed or missing teeth. These oral health problems can substantially limit a person's free choice, proper chewing, mastication, and digestion of food. A low BMI is easily explainable on the basis of real functional difficulties that can prevent normal eating in some cases. While this does not always hold true, it may partly explain the relationship between BMI and oral health.<sup>3</sup>

There is compelling evidence to suggest that periodontal disease progresses more rapidly in undernourished populations.<sup>2</sup> Most obviously, the oral cavity is the first point of entry of food into the body and serves in the chewing, tasting, and swallowing of food. Additionally, edentulous individuals prefer soft and processed foods, avoiding fruit, vegetables, and meats that are considered difficult or impossible to chew, and present a lower intake of vitamin C, calcium, non-starch polysaccharides, and protein. The lower intake of vitamin C is related to a lower consumption of key foods that are considered hard to chew by most individuals with highly impaired dentition.<sup>2</sup>

In conclusion, the present study identified an inverse relationship between oral health (as assessed by DMFT score) and the nutritional status of the free-living elderly. Impaired dentition can affect individuals by causing dietary restrictions via difficulty in chewing, possibly compromising their nutritional status and well being. The results of the present study, however, cannot be generalized to all elderly populations in

Pakistan. As stated earlier, this was a small pilot study with limited resources and other constraints. A more generalized study is needed to address the problem of poor oral and dental health in relation to deteriorating nutritional status of the elderly in order to prepare to face the aging challenge in coming decades. We suggest studies adopting a prospective epidemiological design to further elucidate the problem.

Received 17th November 2009. Accepted 26th January 2010.

From the Tübingen Aging and Tumor Immunology Group (Alam), Tübingen University, Germany, and the International Dental Clinics and Laboratories (Bangash), Peshawar, Pakistan. Address correspondence and reprints request to: Iftikhar Alam, Tübingen Aging and Tumour Immunology Group, Sektion für Transplantationsimmunologie und Immunohämatologie, University of Tübingen, Zentrum für Medizinische Forschung, Waldhörnlestraße 22, 72072 Tübingen, Germany. Tel. +49 (7071) 2981269. Fax. +49 (7071) 294677. E-mail: ialamk@yahoo.com

## References

1. de Andrade FB, de França Caldas A Jr, Kitoko PM. Relationship between oral health, nutrient intake and nutritional status in a sample of Brazilian elderly people. *Gerodontology* 2009; 26: 40-45.
2. Gaião LR, de Almeida MEL, Filho JGB, Leggat P, Heukelbach J. Poor Dental Status and Oral Hygiene Practices in Institutionalized Older People in Northeast Brazil. *International Journal of Dentistry* 2009. doi:10.1155/2009/846081
3. Locher JL, Ritchie CS, Robinson CO, Roth DL, Smith West D, Burzio KL. A multidimensional approach to understanding under-eating in homebound older adults: the importance of social factors. *Gerontologist* 2008; 48: 223-234.
4. World Health Organization. Oral health surveys: Basic Methods. 4th ed. Geneva (CH): WHO; 1997.
5. World Health Organization. Obesity: preventing and managing the global epidemic. Report of a WHO consultation. *World Health Organ Tech Rep Ser* 2000; 894: i-xii, 1-253.
6. Pakistan Institute of Development Economics. National Nutrition Survey 2001-2002. Islamabad: Planning Commission, Government of Pakistan; 2003.

## Do you have any comments or questions? Agree or disagree with published articles?

The correspondence section within the journal is a forum to comments on any of the articles published in the journal. Correspondence will not be sent for peer review, and will only be edited for the use of appropriate language. All correspondence should be submitted and published within 6 months from the date of the original publication.

Please submit your correspondence through the journal website ([www.smj.org.sa](http://www.smj.org.sa)), and don't forget to clearly state the title of the original publication, and your contact details.