

## Edentulism and Tooth Loss in Iran: SEPAHAN Systematic Review No. 6

Saber Khazaei<sup>1</sup>, Malih Sadat Firouzei<sup>1</sup>, Shirin Sadeghpour<sup>2</sup>, Pegah Jahangiri<sup>2</sup>, Omid Savabi<sup>3</sup>,

Ammar Hassanzadeh Keshteli<sup>4</sup>, Peyman Adibi<sup>4</sup>

<sup>1</sup> Dental Students' Research Center,  
School of Dentistry, Isfahan University of  
Medical Sciences, Isfahan, Iran.

<sup>2</sup> Medical Students' Research Center,  
School of Medicine, Isfahan University of  
Medical Sciences, Isfahan, Iran.

<sup>3</sup> Department of Prosthodontics and  
Torabinejad Dental Research Center,  
School of Dentistry, Isfahan University of  
Medical Sciences, Isfahan, Iran.

<sup>4</sup> Integrative Functional Gastroenterology  
Research Center, Isfahan University of  
Medical Sciences, Isfahan, Iran.

### Correspondence to:

Dr. Omid Savabi

Department of Prosthodontics, School of  
Dentistry, Isfahan University of Medical  
Sciences, Isfahan, Iran

Email: savabi@dnt.mui.ac.ir

Date of Submission: Apr 12, 2011

Date of Acceptance: June 13, 2011

**How to cite this Article:** Khazaei S,  
Firouzi MS, Sadeghpour Sh, Jahangiri P,  
Savabi O, Keshteli AH, Adibi P. Edentul-  
ism and tooth loss in Iran: SEPAHAN  
systematic review No. 6. *Int J Prev Med*  
2012; Special issue, S42-7.

### ABSTRACT

**Objectives:** Tooth loss appears to have an important role in the loss of mastication and esthetics. The aim of this systematic review was to investigate the prevalence of tooth loss and edentulism in the Iranian population.

**Methods:** Studies reviewed in this article were primarily identified via search of the online bibliographic databases including PubMed and Iranian Biomedical Journals, by using “tooth loss”, “edentulism”, “epidemiology”, and “Iran” as keywords. Studies potentially related to this topic were retrieved and the selection criteria applied. From the chosen studies the eligible articles were reviewed.

**Results:** Of the studies identified after conducting the search, 10 eligible studies were extracted. The prevalence of tooth loss ranges between 0.3% in 3 to 5-year-old children to 70.7% in adults over 65. There is a lack of well-designed epidemiological studies on edentulism and tooth loss in Iran. The prevalence of tooth loss is high and it increases by aging.

**Conclusions:** It seems that the prevalence of tooth loss is high among adults in Iran. It is highly suggested that population-based studies should be established to investigate the epidemiology and risk factors of tooth loss in Iran. The results of such studies will be useful in the adoption of appropriate preventive strategies.

**Keywords:** Tooth loss, edentulism, prevalence, Iran.

### INTRODUCTION

Tooth loss is considered to have an important role in the loss of mastication and esthetics. The number and condition of teeth influence food choice, diets, and nutrition intake. It has been demonstrated that insufficient dentition can cause problems in food intake through masticatory dysfunctions.<sup>[1]</sup> Mastication abilities seem to have a pivotal role in the digestion system and the overall health condition of an individual, and this is the reason for which many health care administrators emphasize this concept. Edentulism, defined as total tooth loss, is more prevalent among people without a high school education and dental insurance, the lower social class, and current everyday smokers.<sup>[2]</sup> Medina-Solis et al. reported the prevalence of edentulism in Mexican adults to be 6.3%.<sup>[3]</sup> Muller et al. in a systematic review showed that tooth loss and edentulism are declining in European countries.<sup>[4]</sup> Musacchio et al. carried out a large community-based cohort study of 3054 elderly subjects (aged over 65) of both

sexes in northern Italy. They reported that the prevalence of edentulism was 44.0%. Menopause, number of children (more than 3), living alone (for women), serum albumin below 40 g/l, and smoking were the most related risk factors.<sup>[5]</sup>

According to previous studies age, gender, systemic diseases such as diabetes mellitus, social and geographical disparities, and patient and dentist attitudes of the oral health status are the most risky factors of tooth loss.<sup>[6, 7]</sup> Many studies reported that women had a high prevalence of edentulism which was in accordance with some studies in Iran.<sup>[4, 8]</sup> Moreover, it is demonstrated that tooth loss is increased by aging.<sup>[4]</sup> Complete edentulism can affect individuals in various ways. In a study by Felton, complete edentulous people were found to be at a higher risk of poor nutrition, weak chewing ability, coronary artery plaque formation and certain cancers.<sup>[9,10]</sup>

There is heterogeneity in the reported prevalence of edentulism and tooth loss in different parts of Iran. This difference may be due to the diversity in social, cultural, and geographical conditions of these areas.<sup>[4]</sup> The aim of the present study was to systematically review previous studies on the prevalence of edentulism and tooth loss within the Iranian population. Additionally, this review provides background knowledge on the oral health track of the "Study on the Epidemiology of Psychological, Alimentary Health and Nutrition" (SEPAHAN).<sup>[11]</sup> The data of SEPAHAN will estimate the impact of oral health, masticatory dysfunction, and tooth loss on functional gastrointestinal disorders (FGIDs) and will be published later by the same study group.

## METHODS

We studied the prevalence of tooth loss and edentulism in Iran through a systematic review of previous literature and evidence.

We searched three electronic databases including PubMed, ISI web of science and Iran Medex (www.iranmedex.com) in December

2011. The electronic database of Iran Medex was searched to particularly find articles in the Persian language.

To identify related articles in PubMed, the query was: "tooth loss"[MeSH Terms] OR "tooth loss"[All Fields] AND ("Iran"[MeSH Terms] OR "Iran"[All Fields]). To search in the Iranian database, "tooth loss" and "edentulism" and their equivalent in Persian were used as key words.

Articles presenting data on the prevalence of tooth loss in Iran, published from 1978 to December, 2011 were selected. An additional hand search of the reference lists of the included articles was also performed. Only articles in the Persian and English languages were selected. If a study had multiple publications (Persian and English), the results were included only once.

From the selected articles, information on the first author, year of publication, study location, study design, study population, sample size, age, and prevalence of tooth loss were extracted.

## RESULTS

Six studies were found by searching in the ISI web of Science and PubMed, three of which were relevant. The Iran Medex website search listed 113 studies. After reviewing the articles' titles and abstracts, only seven studies were found to be appropriate. Finally, 10 studies were selected according to our previously stated inclusion criteria (Table 1).

Ten studies were included (seven articles in Persian and three in English). They were published from 1999 to 2011. There was a remarkable wide range in the prevalence rate of tooth loss reported by different studies varying from 0.3% in 3 to 5-year-old children to 70.7% in adults over 65. Hessari et al. reported the prevalence of edentulism, to be 3% among 35 to 44-year-old Iranians. Of dentate subjects, 3% had 1-9 teeth, 21% had 10-19 teeth, 37% had 20-24 teeth and 39% had 25-28 teeth.<sup>[8]</sup> It is worthy to note that this study had the largest sample size (8240) in comparison to others on this subject.

**Table 1.** Prevalence of tooth loss in Iranian population

Study's first author (Year)	Province	Study design	Sample (n)	Age (years)	Prevalence of tooth loss	Results/comments
Bonakdarchian (2011) <sup>[16]</sup>	Yasooj	Cross-sectional (Cluster-random sampling)	400	> 35	35-44: 9.5% 45-64: 40.7% > 71.1%	Tooth loss increased by aging
Aghili (2010) <sup>[12]</sup>	Yazd	Cross-sectional	Institutionalized (77) On home (74)	> 70	On home 23% Institutionalized elderly 8.7%	Oral hygiene education and treatment is necessary for Institutionalized elderly
Nassani (2009) <sup>[13]</sup>	Kerman	Cross-sectional (patients of University Dental Hospital, Manchester in UK, and the outpatient clinic of Kerman Dental School, Kerman, Iran)	158 84 from UK 74 from Iran	< 39 To > 60	< 39: 41.8% 50-59: 35.4% > 60: 29.8%	All participants had experienced tooth Loss, 79.1% had dentitions with unrestored dental spaces at the time of the interview
Khadem (2009) <sup>[17]</sup>	Isfahan	Cross-sectional (Simple-random sampling)	200	55-80	Edentulous: 47% Partial edentulous: 53%	Most cases had problems in mastication
Hessari (2008) <sup>[8]</sup>	Nationwide	Cross-sectional (Population based surveys)	8240	35-44	Overall 3% were edentulous 3% had 1-9 teeth 21% had 10-19 teeth 37% had 20-24 teeth 39% had 25-28 teeth	The greatest unmet treatment needs were found among those without a functional dentition. Functional dentition should be set as a primary oral health goal among working age adults
Hessari (2008) <sup>[15]</sup>	Nationwide	Cross-sectional (Population based survey)	8700	17-19	16% had 1 tooth loss 8% had 2 tooth loss 6% had 3 or more tooth loss	Tooth loss was less prevalent in men than women

Table 1. Continue

Afshar (2008) <sup>[14]</sup>	Tehran	Cross-sectional	1000	3-5	0.3%	3 cases had dental abnormalities and 3 cases had missing teeth
Shaghayegh (2003) <sup>[21]</sup>	Hamadan Torbat-heidarie Yazd	Cross-sectional (cluster random sampling)	1911	> 35	Hamadan: 52.5% Torbat-heidarie: 32.8% Yazd: 40.7%	Age, income and education level have a significant effect on oral health
Ajami (2000) <sup>[22]</sup>	Mashhad	Cross-sectional	338	35-44 > 44 > 65	35-44: 7.6% > 65: 70.7%	Tooth loss increased by aging
Torkzaban (1999) <sup>[23]</sup>	Hamadan	Cross-sectional (cluster random sampling)	761	> 35	Edentulous: 52.04% Partial edentulous: 42.18%	Prevalence of tooth loss is high

Aghili et al. demonstrated that institutionalized elderly people have more complications in oral health and fewer teeth, and that there is a need for oral hygiene instructions for the elderly.<sup>[12]</sup> Nassani et al. compared the dental health status of two different cultures and showed significant differences between utility values among the British and Iranian population. In the comparison of the British and Iranian samples, no difference was observed in the dental status by gender between the two populations, but significant differences by age and dentition status was reported.<sup>[13]</sup>

Afshar et al. carried out a survey on tooth loss among 1000 children aged 3-5 years and reported that only 3 (0.3%) boys had missing teeth.<sup>[14]</sup>

Hessari et al. evaluated the dental status of 4448 18-year-old Iranians. They reported that 18-year-old Iranians had an average of 27.4 teeth, of which 23.7 were sound. Of the 4448 subjects, 3071 (70%) retained all their teeth, 703 (16%) had lost 1 tooth, 383 (8%) had 2 missing teeth and 291 (6%) had 3 or more. Tooth loss was significantly less prevalent among men and in urban residents (29% vs. 33% in rural residents) and those with a high level of education

(27% vs. 40% in subjects with a low level of education).<sup>[15]</sup>

Bonakhdarchian et al. evaluated the prevalence of edentulism and its related risk factors in Yasooj. According to their study, the prevalence of edentulism was 9.5% among 35 to 44-year-old subjects, 40.7% among 45 to 64-year-old subjects and 71.1% for individuals aged over 65 years of age. They showed that the number of lost teeth had increased significantly with age and that there was no significant relationship between edentulism and sex. In addition, they found a significant relationship between edentulism and job, dental caries, periodontal disease, smoking, poor oral hygiene and the intake of sugar-rich foods.<sup>[16]</sup>

Khadem et al. investigated the relationship of edentulism and the quality of life in institutionalized elderly people in Isfahan using the General Oral Health Assessment Index (GOHAI). Dental status in 200 randomly selected elderly subjects (55 to 80-year-olds) was classified into six groups. Which were: 1) edentulism with dentures (29%); 2) edentulism without dentures (17.5%); 3) only anterior teeth remaining (11.5%); 4) only posterior teeth remaining (1%); 5) lost both anterior and posterior teeth (24%);

and 6) all teeth remained (16.5%). They concluded that institutionalized elderly people would need more treatment and interventions.<sup>[17]</sup>

## DISCUSSION

The results of ten epidemiological studies were reviewed in this article. The quality of those studies varied considerably, making a direct comparison difficult. In these studies, the prevalence of tooth loss ranged between 0.3% in 3 to 5-year-old children to 70.7% in adults over 65. Unfortunately, there is a lack of epidemiological studies on the prevalence of tooth loss and edentulism in Iran and data were only available from a few cities.

To date, two nationwide epidemiological studies on tooth loss have been carried out in Iran; the first one on 18-year-old Iranians<sup>[15]</sup> and the second one on 35 to 44-year-old adults.<sup>[8]</sup> In the first study, the prevalence of tooth loss was not very high. However, there was a high prevalence of dental plaque, calculus, periodontal pockets and untreated dental caries especially among underprivileged groups, which may put 18-year-old Iranians at risk of tooth loss in their adulthood.<sup>[8]</sup> In the second study, Hessari *et al.* evaluated 8240 individual, and reported the overall prevalence of edentulism to be 3%. In this study, of dentate subjects, 3% had 1-9 teeth, 21% had 10-19 teeth, 37% had 20-24 teeth and 39% had 25-28 teeth.<sup>[8]</sup>

Gender tends to be an important factor in the prevalence of edentulism.<sup>[4]</sup> Many studies supported the hypotheses that edentulism is more prevalent in women than in men.<sup>[4, 15]</sup> Although there are a number of reasons related to tooth loss, but more prosthodontic rehabilitation among women may be associated with high rates of edentulism, which indicate the greater importance of esthetics among them. In Iranian studies, the number of lost teeth increased by aging and in many elderly people aged 65 and over dentition reduced. The reason for this could be dental caries, periodontal disease, prosthetic reasons, trauma, pains and infection (peri-apical lesions) and patient's request. Although it has

been stated that tooth loss seems to be more dental disease-related than socio-behavioral disease-related<sup>[18]</sup>, Hessari *et al.* reported the high rates of edentulism among the less educated and people of a lower socio-economic status in Iran.<sup>[8, 15]</sup>

Muller *et al.* reviewed the prevalence and incidence of tooth loss in Europe. They found that tooth loss and edentulism are declining in European countries. They reported that the prevalence of edentulism would decrease up to 50-60% over the next 20 years in European countries.<sup>[4]</sup> Data reported from Centers for Disease Control and Prevention (CDC) demonstrated that the percentage of the U.S. population who were edentulous varies by state. Between the 1950s and the early 1990s, the prevalence of edentulism in the U.S. decreased from 50% to 42% among people aged 65 and older, from 28% to 11% for 45- to 64-year-olds, and from 5% to 2% for 18 to 44 year olds.<sup>[7]</sup>

There are many factors affecting the prevalence of edentulism such as education, occupation, personal economic situation, attitude toward dental care, and lifestyle. Several studies have also reported a significant relationship between dental diseases (caries, periodontitis), systemic conditions (diabetes mellitus) and lifestyle factors (smoking, dental anxiety).<sup>[6, 19-20]</sup> However, in Iranian studies, the role of these potential risk factors has not been explored. Iranian studies are usually restricted to large cities and there is scarce data on individuals living in rural regions.

Although there were many limitations in previous studies in Iran, it seems that the prevalence of tooth loss is high in Iran especially among adults. Preventive strategies to decrease the burden of tooth loss are of great importance. It is highly suggested that population-based studies be conducted to investigate the epidemiology and risk factors of edentulism and tooth loss in Iran. It is also important to evaluate the effect of tooth loss on the quality of life, food intake, and other medical conditions within the Iranian population.

## REFERENCES

1. Sheiham A, Steele J. Does the condition of the mouth and teeth affect the ability to eat certain foods, nutrient and dietary intake and nutritional status amongst older people? *Public Health Nutr* 2001; 4(3): 797-803.
2. Total tooth loss among persons aged > or =65 years--selected states, 1995-1997. *MMWR Morb Mortal Wkly Rep* 1999; 48(10): 206-10.
3. Medina-Solis CE, Perez-Nunez R, Maupome G, Casanova-Rosado JF. Edentulism among Mexican adults aged 35 years and older and associated factors. *Am J Public Health* 2006; 96(9): 1578-81.
4. Muller F, Naharro M, Carlsson GE. What are the prevalence and incidence of tooth loss in the adult and elderly population in Europe? *Clin Oral Implants Res* 2007; 18(Suppl 3): 2-14.
5. Musacchio E, Perissinotto E, Binotto P, Sartori L, Silva-Netto F, Zambon S, et al. Tooth loss in the elderly and its association with nutritional status, socio-economic and lifestyle factors. *Acta Odontol Scand* 2007; 65(2): 78-86.
6. Taylor GW, Manz MC, Borgnakke WS. Diabetes, periodontal diseases, dental caries, and tooth loss: a review of the literature. *Compend Contin Educ Dent* 2004; 25(3): 179-8, 190.
7. Matthews JC, You Z, Wadley VG, Cushman M, Howard G. The association between self-reported tooth loss and cognitive function in the REasons for Geographic And Racial Differences in Stroke study: an assessment of potential pathways. *J Am Dent Assoc* 2011; 142(4): 379-90.
8. Hessari H, Vehkalahti MM, Eghbal MJ, Murtomaa H. Tooth loss and prosthodontic rehabilitation among 35- to 44-year-old Iranians. *J Oral Rehabil* 2008; 35(4): 245-51.
9. Felton DA. Edentulism and comorbid factors. *J Prosthodont* 2009; 18(2): 88-96.
10. Sadighi Shamami M, Amini S. Periodontal disease and tooth loss as risks for cancer: A systematic review of the literature. *Iranian Journal of Cancer Prevention* 2011; 4(4): 189-98.
11. Adibi P, Keshteli AH, Esmailzadeh A, Afshar H, Roohafza H, Bagherian-Sararoudi H, et al. The study on the epidemiology of psychological, alimentary health and nutrition (SEPAHAN): overview of methodology. *J Res Med Sci* 2012; 17(5) In Press.
12. Aghili H, Ahadian H, Baghiani Moghaddam MH. Dental health and treatment needs of elderly home residents and non-residents in Yazd city. *Health System Research* 2010; 6(1): 116-23.
13. Nassani MZ, Locker D, Elmesallati AA, Devlin H, Mohammadi TM, Hajizamani A, et al. Dental health state utility values associated with tooth loss in two contrasting cultures. *J Oral Rehabil* 2009; 36(8): 601-9.
14. Afshar H, Shahrabi M, Salami K. Prevalence of missing and supernumerary teeth in 3-5 years-old, kindergarten children of Tehran. *Journal of Islamic Dental Association of Iran* 2009; 20(4): 273-7.
15. Hessari H, Vehkalahti MM, Eghbal MJ, Samadzadeh H, Murtomaa HT. Oral health and treatment needs among 18-year-old Iranians. *Med Princ Pract* 2008; 17(4): 302-7.
16. Bonakdarchian M, Ghorbanipour R, Majdzadeh F, Hojati T. Prevalence of edentulism among adults aged 35 years and over and associated factors in Yasooj. *Journal of Isfahan Dental School* 2011; 7(1): 101-4.
17. Khadem P, Jabbarifar E, Maroofi V, Feiz A. The effect of using dentures in the improvement of lifestyle among the elderly population of Isfahan, Iran. *Journal of Isfahan Dental School* 2009; 5(3): 148-55.
18. Burt BA, Ismail AI, Morrison EC, Beltran ED. Risk factors for tooth loss over a 28-year period. *J Dent Res* 1990; 69(5): 1126-30.
19. Oliver RC, Brown LJ. Periodontal diseases and tooth loss. *Periodontol* 2000 1993; 2: 117-27.
20. Hanioka T, Ojima M, Tanaka K, Matsuo K, Sato F, Tanaka H. Causal assessment of smoking and tooth loss: a systematic review of observational studies. *BMC Public Health* 2011; 11: 221.
21. Shayegh SSH, Salari AM. A study of the prevalence of edentulous cases in Iran during 1998-99. *Shahid Beheshti Medical Sciences University Journal of The Dental School* 2003; 1(21): 61-5.
22. Ajami BM. An epidemiologic survey on the dental health status of 35-44 year old and those above 64 years of age in Mashhad, 1998. *Shahid Beheshti Medical Sciences University Journal of The Dental School* 2000; 18(3): 224-30.
23. Torkezaban P. The survey of the edentulousness prevalence in population over 35 years old in Hamadan in Dec/1997. *Scientific Journal of Hamadan University of Medical Sciences & Health Services* 1999; 6(13): 43-9.

**Source of Support:** Nil **Conflict of Interest:** None declared