Oral health Survey of a population living in nursing homes in Catalonia.

Rosa Moreno López

Dipòsit Legal: B 23012-2014

Oral Health Survey of a population living in nursing homes in Catalonia.

Author: Mrs. Rosa Moreno López

Department of Gerodontology and Special Care Dentistry
Dental School (Facultad de Odontología)
Universitat Internacional de Catalunya
February 2014

Director: Dr. Josep Cabratosa Termes
Co-Director: Dr. Manuel Ribera Uribe

ACKNOWLEDGEMENTS

It has been a very long journey, since day one, when I was in my last year of dental studies I decided I wanted to do a small project to present in a conference. That project developed to a thesis which I am now presenting.

Many people contributed to this happening and I would like to acknowledge all of them.

To my mentor, tutor and friend, Dr. Manuel Ribera I would like to thank him for all the knowledge he has given me throughout the years. He has been there in all the process of this thesis, in all the bad ones (which have been a few) as well as to all those great moments. He has been able to show me how, with just some patience and affection you can treat and comprehend elderly patients, making their lives a little bit happier.

I would also like to thank Dr. Inmaculada Vela and Dr. Belisa Olmo who have always been there to help me whenever I needed them. They are great colleagues, but overall they have become very good friends. Without their support I would not had been able to have finished this project.

Thanks to Dentaid for their donation of toothbrushes that we gave to all the patients that participated in this survey.

And last but not least I would like to thank my family and my husband for all of their support. They have been there throughout my career and they know what this achievement means to me. They have had to cope with all ups and downs. However in those tough moments they have always cheered me up. They are the real co-authors on this thesis.

To all of you, thank you.

INDEX

1. JUSTIFICATION FOR THE STUDY:

Successful ageing, which gives the highest autonomy possible for the elderly, is the one that everyone aspires to. It is based on this objective that the "Departament de Sanitat i Seguretat Social" of Generalitat de Catalunya on its publication: "L'atenció sociosanitària a Catalunya. Vida als anys"[1], aims for on their motto: "ageing, health and quality of life" stating that this should be one of the axis of welfare policies and research of the coming years.

In the age range 75-80 years there is a rise on the physiological indicators of fragility, thus increasing the need for support and the use of health services[1]. The dental requirements will also be different from what dentists are used to treating, as we will start to see patients with very heavily restored dentitions, with severe chronic periodontitis and multiple cases of severe tooth wear.

The majority of elderly patients are partially or completely edentate. This may mean that they require new dentures or repairs to old dentures to improve the function of the denture and ability to eat properly again. Elderly patients may have bad oral hygiene, making them more susceptible to having periodontal disease. We need to use specific indices to be able to evaluate those differences, and we need to bear in mind their self-perception of oral health, as well as their cognitive impairments in order to plan an accurate treatment plan.

The most recent studies carried out in Catalonia on oral health in institutionalized elders were more than 20 years ago[2-3]. Together with other studies done in other regions of Spain[4-7] where there was lack of homogeneity we believed that we needed to update the data we currently had following the new guidelines of WHO[8].

In the 80s, there were similar studies done on primary schools to try to decrease the number of decayed teeth on children in Catalonia by introducing fluoride mouthwashes on a weekly basis[9-10]. Thanks to these studies they

contributed to raise awareness to the population, as well as politicians, so that better social healthcare decisions could be taken by the Generalitat de Catalunya.

We aim that by providing new data on the oral health of people over 65 years in Catalonia living in nursing homes, as well as their treatment needs and their own perception of their oral health it will document and justify new political decisions in regards to preventive and health care programs for the elderly people.

2. INTRODUCTION:

2.1 AGEING OF THE POPULATION:

The ageing of the population is one of most important demographic transformation in our society. The high proportion of elderly people (people aged 65 or over) in the community is a challenge of extraordinary consequences to be able to meet their social, health, economic and cultural demands. These demographic changes are more important in the industrialised countries.

Moreover, in the last decade there have been changes in the demographic of the population aged over 65 years. Of particular interest is the rise in the number of people aged over 85 years, consequentially increasing life expectancy, especially in the developed world.

Based on the "World Population Prospects: The 2006 Revision, Highlights" by the United Nations[11], by 2050, 93 countries will expect to have a median age above 40, and forty-eight of these countries will be in the developing world. It is also expected that by 2050, 92 countries will have populations where those aged 80 years or older will account for more than 4.4% of the population. In 23 of those countries, led by Japan and Singapore, the oldest-old will be expected to account for over 10% of the population (Fig,1 and 2).

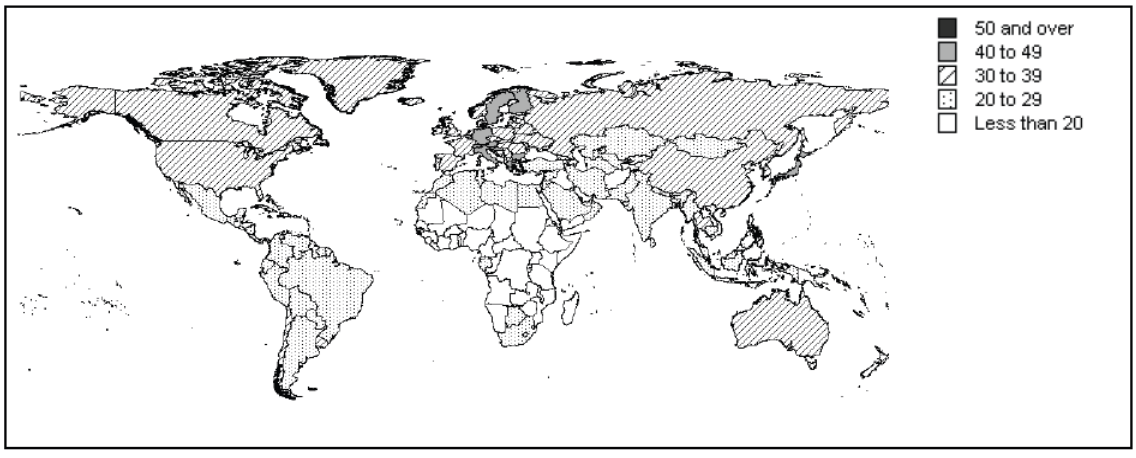

Fig. 1: Median age in 2005. Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. World Population Prospects: The 2006 Revision, Highlights. New York: United Nations; 2007.

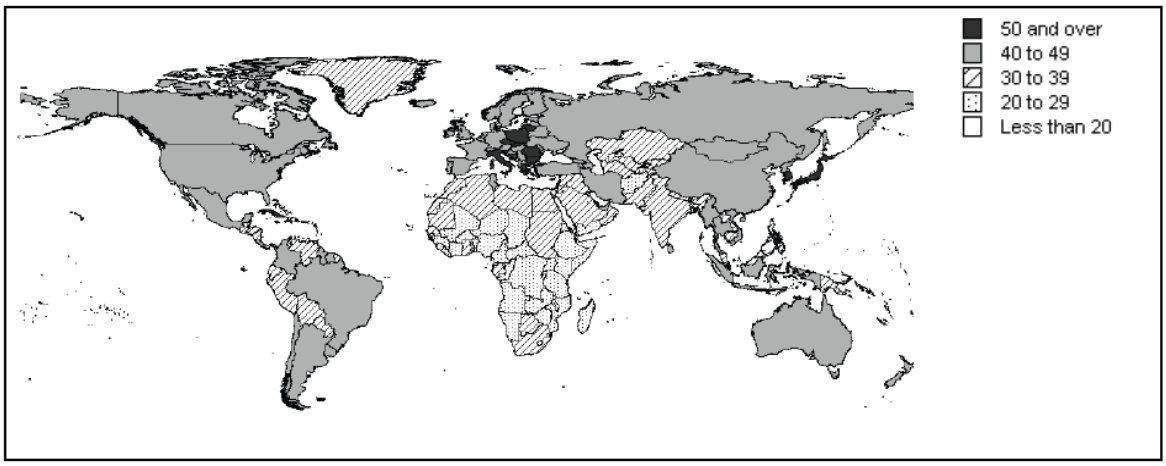

Fig. 2: Median age in 2050. Source: Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. World Population Prospects: The 2006 Revision, Highlights. New York: United Nations; 2007

The number of people over 65 years has also risen considerably in Catalonia, a region in the northeast of Spain. In 2010 the percentage of people over 65 years old was 16.49% and is estimated to be 26.63% in 2041[12].

This is thought to be due to the improvements on living conditions and preventive policies during childhood and adult life that life expectancy has risen considerably in Spain, reaching the age of 80.5 in 2005[13].

The coverage index of places in nursing homes in Catalonia in January 2007 was 4.69%. The number of residents was 30,132 patients in January 2007 (Fig. 3 and 4). Only 13% of those nursing homes were public. The user profile was women over the age of 80 (78%) with most of them having some kind of dependency in doing the basic activities of daily living. The mean age of the residents was 84 years of age[13].

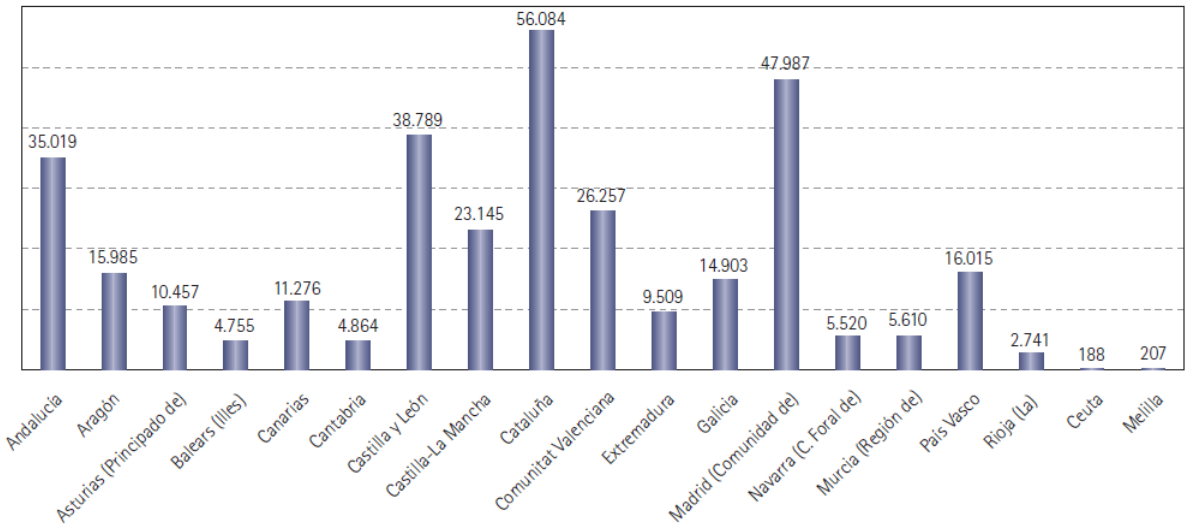

Fig. 3: Number of places in nursing homes per *Comunidad autónoma* (Spanish administrative regions)[13].

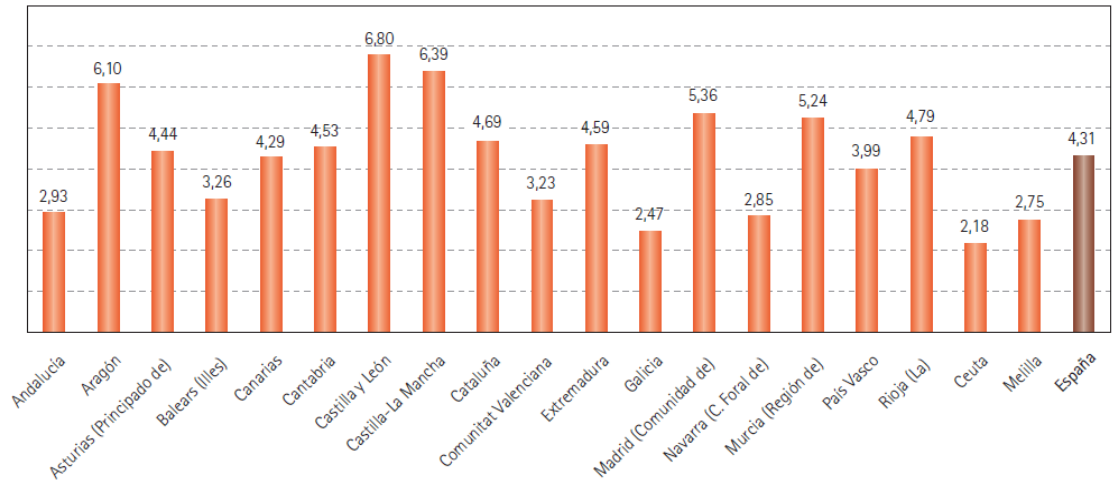

Fig 4: Coverage index of places in nursing homes per *Comunidad autónoma*[13] (Spanish administrative regions). Coverage index = (number of places in nursing homes/population ≥65) x 100.

In the last health survey in Catalonia (2012)[14], people over 65 years of age stated that their self-perceived health status was good on 42.2% and regular on 35.2%. There is an augment of dependency on the activities of daily living as the age increases as well as an increase in people with depression. 35.8% of those over 65 years have taken five or more drugs in the last 2 days, and 41% have some sort of disability. Only 2.8% has difficulty in eating and require help.

In this survey 68.3% of the over 65s has not been to the dentist in the last 12 months.

2.2 ORAL HEALTH IN INSTITUTIONALISED ELDERLY PATIENTS:

2.2.1 CARIES:

Dental caries is an infectious process that results in destruction of the mineralized tooth structure. This process is initiated when the biofilm starts to form on the tooth structures such as the enamel, the dentine or the cementum. These surfaces are coated by this pellicle to which the microbial cells attach and grow. Bacteria present in the biofilm are always metabolically active, causing changes in the pH. These changes are the main cause of loss of minerals from the tooth when the pH drops, but gains minerals when it rises. These cumulative effects of de/re-mineralization process results in an unfavourable environment which might lead the hard tissue structure of the tooth to dissolve and start the formation of a caries lesion[15].

Root caries is a consequence of the exposure of the root to the oral environment mainly due to periodontal disease and gingival recession[16]. It has been associated with old age and gingival recession and this is consistent with the concept that root caries occurs in a location near the crest of the gingiva where dental plaque can accumulate more easily[17]. There are various differences between root and coronal caries, which are described on table 1.

	Coronal caries	**Root caries**
Surface tissue	Enamel	Cementum or dentine
Risk factor	S. mutans and Lactobacillus	S. mutans and Lactobacillus
Predisposing factors	Oral hygiene, diet, salivary flow, fluoride exposure	Oral hygiene, diet, salivary flow, fluoride exposure
Composition (by weight)	Enamel: 95-97% mineral, 3-5% organic and water. Dentine: 65-70% mineral, 30-35% organic and water.	Dentine: 65-70% mineral, 30-35% organic and water. Cementum: 45-55% mineral, 45-55% organic and water.
Histopathology	Primarily demineralization	Demineralization and

		proteolysis.
pH	Demineralization occurs at pH 5.5	Demineralization can begin at pH 6.7
Enamel	Bacterial invasion followed by demineralization.	n/a
Cementum	n/a	Bacterial invasion followed by demineralization and proteolysis occurring simulataneously.
Dentin	Bacterial penetration of tubules, demineralization of intertubular dentine, sclerosis of lumens of dentine tubules, destruction of lumens and peritubular dentine, proteolysis of the organic component.	Bacterial penetration of tubules, demineralization of intertubular dentine, sclerosis of lumens of dentine tubules, destruction of lumens and peritubular dentine, proteolysis of the organic component.
Remineralization	Occurs on remaining mineral	Occurs on remaining mineral (not on collagen matrix devoid of mineral)
Lesion progression	It takes 3 to 4 years for caries to progress through enamel. Time to progress through dentine is unknown.	Time to progress through cementum or dentine is unknown.

Table 1: Comparison between root caries and coronal caries[17].

It has been previously stated that the risk of root caries is much greater in those patients who are older, medically compromised or are institutionalized[14]. It has also been estimated by Leake[18] that 8.2% of people living in nursing homes in North America would be expected to acquire one or more new root caries in any year.

Billings[19] published in 1986 a criterion to assess root caries depending on its severity, taking into account surface texture, surface defect and pigmentation:

- Grade 1 (Incipient):
  - Surface texture: soft, can be penetrated with a dental probe.
  - No surface defect.
  - Pigmentation: variable light tan to brown.
- Grade 2 (Shallow):
  - Surface texture: soft, irregular, rough, can be penetrated with a dental probe.
  - Surface defect: less than 0.5mm in depth.
  - Pigmentation: Variable, tan to dark brown.
- Grade 3 (Cavitation):
  - Surface texture: soft, can be penetrated with a dental probe.
  - Penetrating lesion, cavitation present greater than 0.5mm in depth, no pulpal involvement.
  - Pigmentation variable: light brown to dark brown.
- Grade 4 (Pulpal):
  - Deeply penetrating lesion with pulpal or root canal involvement.
  - Pigmentation variable, brown to dark brown.

It is also very important to identify the risk for root caries. Jones proposed in 1995[20] a classification so that preventive measures could be better targeted to those patients:

- Low risk patients: Lack of new root caries lesions in the last 3 years, good oral hygiene and regular visits to the dentists.
- Moderate risk patients: 1 or 2 new root caries lesions in the last 3 years, gingival recession, intake of medicines, presence of cognitive impairment.
- High risk patients: 3 or more root caries lesions in the last 3 years, previous restorations, significant gingival recession, dependent (either by cognitive impairment or physically and or dry mouth syndrome).

2.2.2 PERIODONTAL DISEASE:

There are many reasons to believe that increasing age could lead to be a potential risk factor for periodontal disease, from the histological changes seen in the oral epithelium (thinning of the epithelium and diminished keratinization)[21] to the decrease in chemotaxis and proliferation of the cells of the periodontal ligament[22], as well as a reduction in bone formation which could result in loss of bone mass[23].

In a recent review comparing the effects of aging and periodontal tissues[24], they concluded that age is associated with some moderate loss of periodontal attachment and alveolar bone, but age alone could not lead to a critical loss of attachment in a healthy adult. This would be more likely to occur as a result of multiple active periods of periodontal disease over time because the main etiological factor is plaque rather than cumulative age factors.

However, there could be confounding variables such as systemic diseases, reduced manual dexterity, oral factors and medications that could have an effect on periodontal disease[25] and these are usually related to institutionalized elders.

2.2.3 PROSTHODONTICS:

The number of people retaining their natural dentition in advanced years is increasing; in the last Spanish oral health survey 44.3% of people age 65 to 74 retained 21 or more functional teeth[26]. However, this value contradicts many surveys done in nursing homes where the number of functional teeth is much lower, increasing as well the number of edentulous patients.

This is the reason why providing prosthetic treatment is so important in an aged population. The main indication for providing this type of treatment is to be able to restore the masticatory function, aesthetics, as well as comfort and speech. That is why it is very important to assess the quality of life or the self-perception of the patients after providing such treatments to be able to assess if we are restoring all the aspects named above.

The number of teeth required to be restored by means of any type of prosthetic treatment seems to be eight occluding pairs of teeth in the anterior and premolar region[27,28]. These two studies supported this theory as it seems to be sufficient to satisfy patient's aesthetics as well as their functional demands. However, a more recent study published by Narby et al.[29] in regards to the need of prosthetic treatment, could not find any proper subjective nor objective need. Instead they believe that by using proper communication skills and reaching mutual respect between the dentists and the patient, those needs would be better assessed; although they pointed out that it could be a more challenging situation when dealing with patients that suffer some sort of cognitive impairment.

2.2.4 SELF-PERCEPTION OF ORAL HEALTH:

Over the last 20 years, a number of questionnaires have been developed to assess and measure oral health-related quality of life (OHRQoL), because its measurement is an essential component on oral health surveys.

The main instruments used to evaluate OHRQoL in a geriatric population are OHIP-14 (Oral Health Impact Profile) developed by Slade and Spencer in 1994[30] and GOHAI (General Oral Health Assessment Index) developed by Atchison in 1990[31].

These questionnaires are similar in respect that they were designed to evaluate physical (aspects related to eating, speaking and swallowing), psychosocial (concerns over oral health status, self-image and awareness of health and limitations of social contact caused by poor oral problems) and pain and discomfort dimensions[32] affecting the oral cavity and related diseases. Although they are widely used in oral health surveys their use in clinical practice and clinical decision making has not been reported[33]. This contraindicates the conclusion that Pizón-Pulido and Gil-Montoya[34] reached in their study, where they reported that self-perceived oral health status can predict the need for care and in turn be used for screening, in addition to helping in planning dental services.

In a recent study published by Sancehz-García et al[35] in Mexico, they concluded that elderly patients with cognitive deterioration in the absence of clinically significant symptoms of depression, showed a higher GOHAI average score (better self-perception) in comparison with those not having these characteristics. They thought that the presence of cognitive deterioration might not allow the participants to recognize their oral health problems; compared with the presence of depression which seemed to exaggerate a negative oral health perception. They also found that the missing and filled components of the DMFT index had a significant correlation with the GOHAI score but that this correlation was low. The same occurred when teeth were healthy and functional. The lack of significant correlation with clinical measures confirmed findings by other researches and suggested that patients may not have identified early dental

disease as a problem, but based their oral health perceptions on other more functional concerns[35].

2.2.5 ORAL HEALTH GOALS IN SPAIN FOR THE YEAR 2020:

In 2009 the General Dental Council in Spain (Consejo de Dentistas) published “Estudio Prospectivo DELPHI. La salud bucodental en España 2020”[36]. On its publication one of their aims was to propose the oral health goals in Spain for the year 2020 using Delphi methodology[37], based on the joint document published by WHO (World Health Organization), FDI (International Dental Federation) and IADR (International Association for Dental Research) where they established an opened guide for each country to define their own oral health goals for the year 2020[38].

Delphi methodology is defined as “a method for structuring a group communication process that is effective in allowing a group of individuals, as a whole, to address a complex problem” meaning that this prediction is based on a systematic intuitive judgment from a panel of experts.

In this study they acknowledged that there will be an increase in demands for dental treatment within the elderly population due to the increase of the ageing population.

The table below shows the aim for each variable as well as the current value based on the last oral health survey in Spain in 2010[26] for the cohort aged 65 to 74:

Variable	Current Value[26]	Aim 2020
DMFT	14.66	≤13.5
People with at least 1 caries	43.5%	≤43%
People with at least 21 functional teeth	44.3%	≥30%
Edentulous people	16.7%	≤13%
Functional limitation issues (problems when eating)	22.6%	≤23%

Table 2: Oral health goals for Spain in 2020.

3. HYPOTHESIS:

- Null Hypotheses (H_0):

1. The oral health of the elderly (more than 65 years old) living in nursing homes is not related to their cognitive status.

2. The oral health of the elderly (more than 65 years old) living in nursing homes is not related to their self-perception of the oral health.

- Alternative hypotheses (H_1):

1. The oral health of the elderly (more than 65 years old) living in nursing homes is related to the cognitive status.

2. The oral health of the elderly (more than 65 years old) living in nursing homes is related to their self-perception of the oral health.

4. AIM AND OBJECTIVES:

The main aim of the study was to know the oral health of people living in nursing homes aged 65 or over in the region of Catalonia, in Spain.

Secondary objectives:

1. Evaluate the presence of any extra oral conditions.
2. Evaluate the presence or absence of any signs or symptoms on the temporomandibular joint.
3. Examine the oral mucosa and the presence of any lesion.
4. Evaluate the periodontal health by using the Periodontal Community Index (CPI) and the Loss of Attachment (LoA).
5. Determine the presence of caries and root caries as well as the DMFT index and Root caries index.
6. Evaluate the needs of dental treatment such as fillings, endodontic, extractions, etc.
7. Evaluate the presence of prosthodontics (fixed or removable) and the need for new ones.
8. Know the frequency of tooth brushing and its relation with their periodontal condition.
9. Evaluate the perception of their oral health and its relation with their oral health.
10. Quantify the number of occlusal pairs by using Eichner Index.
11. Evaluate what is the cognitive status of the patients by using the Pfeiffer Index and its relation with their oral health.

5. MATERIAL AND METHODS:

5.1 STUDY DESIGN:

We developed a cross-sectional epidemiological study on an elderly population living in nursing homes in Catalonia.

To be able to do the fieldwork we required one dentist (who was the main investigator) to perform all the examinations and collect all the data needed for it, so that we reduced the inter-examiner bias to a minimum.

The selection of the nursing homes was at random, by using a guide where you can find all the nursing homes of Spain (www.imserso.es, a web page provided by The Ministry of health, social services and equality). We contacted the nursing homes by phone and then arranged an appointment with them to see residents that wanted to take part in the survey. The director of each residence signed an agreement accepting all the conditions that our ethics committee had accepted beforehand (see annex 5). Then all the volunteers taking part in the survey signed a consent form after we gave them written and verbal information about the investigation. If the patent had any mental impairment, the legal tutor/carer would have signed the consent form prior to us attending the nursing home (see annex 2, 3 and 4).

5.2 SAMPLE:

The sample was calculated from the total number of people over 65 years of age on the electoral register at the start of the project, which was 1,175,519 people (Idescat, 2006). Dr Llopis, the Statistician at the Universitat Intrenacional de Catalunya, supported the researcher in the sample calculation. By using figure 5, we reached to the conclusion that we had to select 635 people living in nursing homes in Catalonia, accepting a 4% error in our calculation.

Amplitud de la población	*Amplitud de la muestra para márgenes de error abajo indicados*					
	±1%	±2%	±3%	±4%	±5%	±10%
500	—	—	—	—	222	83
1.000	—	—	—	385	286	91
1.500	—	—	638	441	316	94
2.000	—	—	714	476	333	95
2.500	—	1.250	769	500	345	96
3.000	—	1.364	811	517	353	97
3.500	—	1.458	843	530	359	97
4.000	—	1.538	870	541	364	98
4.500	—	1.607	891	549	367	98
5.000	—	1.667	909	556	370	98
6.000	—	1.765	938	566	375	98
7.000	—	1.842	959	574	378	99
8.000	—	1.905	976	580	381	99
9.000	—	1.957	989	584	383	99
10.000	5.000	2.000	1.000	588	385	99
15.000	6.000	2.143	1.034	600	390	99
20.000	6.667	2.222	1.053	606	392	100
25.000	7.143	2.273	1.064	610	394	100
50.000	8.333	2.381	1.087	617	397	100
100.000	9.091	2.439	1.099	621	398	100
∞	10.000	2.500	1.111	625	400	100

Fig. 5. This figure shows the number of patients required for a survey depending on different circumstances (in relation to confidence interval and the population size); the columns represent the error and the rows the population amplitude. Taken from: http://estadisticaorquestainstrumento.wordpress.com/2012/12/26/tema-16-determinacion-del-tamano-de-muestra/

We then divided them into the four Provinces that this region of Spain has: Girona, Barcelona, Tarragona and Lleida. The percentage of people seen in each province was in proportion to the number of people over 65 on the electoral register at the start of the project.

We didn’t take into account the number of nursing homes nor the number of residents in the sample calculation as this wouldn’t have given us an accurate representation of the population we were seeking. Furthermore the number of residents is very fluctuant due to the fact that a big proportion of them are frail elders.

- Inclusion criteria: All residents living in nursing homes in Catalonia aged 65 or over, regardless of their medical or mental condition.

- Exclusion criteria: People aged 65 or over not living in nursing homes as well as people younger than 65 that were living in nursing homes.

5.3 STUDY VARIABLES:

The indices that we evaluated were taken from the 4th edition of the Oral health surveys published by WHO[8] (See annex 1).

1. Extra-oral examination: This assessment was performed following this sequence:
    A. General overview of exposed skin areas (head, neck, limbs).
    B. Perioral skin areas (nose, cheeks, and chin).
    C. Lymph nodes (head, neck).
    D. Cutaneous parts of upper and lower lips.
    E. Vermilion border and commissures.
    F. Temporomandibular joint (TMJ) and parotid gland region.

2. Signs and symptoms in the Temporomandibular Joint (TMJ): we asked the patients if they had any kind of symptoms such as occurrence of clicking, pain or difficulties in opening or closing the jaw once or more per week. In regards to the signs we registered these items:
    - Clicking of one or both TMJs: this was evaluated directly by an audible sharp sound or by palpation of the TMJs.
    - Tenderness on palpation of the anterior temporalis and or masseter muscles on one or both sides: this measurement was evaluated by unilateral palpation with the firm pressure of two fingers, exerted twice on the most voluminous part of the muscle. Tenderness was recorded only if this palpation spontaneously provoked an avoidance reflex.
    - Reduced jaw mobility (opening of <30mm): this was a measurement of the distance between the incisal tip of the central maxillary and mandibular incisors.

3. Oral Mucosa Exam: An examination of the oral mucosa and soft tissues in and around the mouth was made on every participant. The examination was carried out following a systematic sequence:
    A. Labial mucosa and labial sulci (upper and lower).

B. The labial part of the commissures and buccal mucosa (right and left).
C. The tongue (dorsal and ventral surfaces, margins).
D. The floor of the mouth.
E. The hard and soft palate.
F. The alveolar ridges/gingiva (upper and lower).

4. Community Periodontal Index (CPI): The mouth was divided into sextants defined as follows 18-14, 13-23, 24-28, 38-34, 33-43 and 44-48. A sextant was only examined if there were two or more teeth present which were not requiring extraction. Index teeth were the teeth to be examined: 17, 16, 11, 26, 27, 37, 36, 31, 46 and 47. The two molars in each posterior sextant were paired for recording and if one was missing, there was no replacement. If no index teeth/tooth was present all the remaining teeth in that sextant were examined and the highest score was recorded. Distal surfaces of third molars were not recorded. A specially designed lightweight CPI probe with a 0.5mm ball tip was used, with a black band between 3.5 and 5.5mm and rings at 8.5 and 11.5mm from the ball tip.

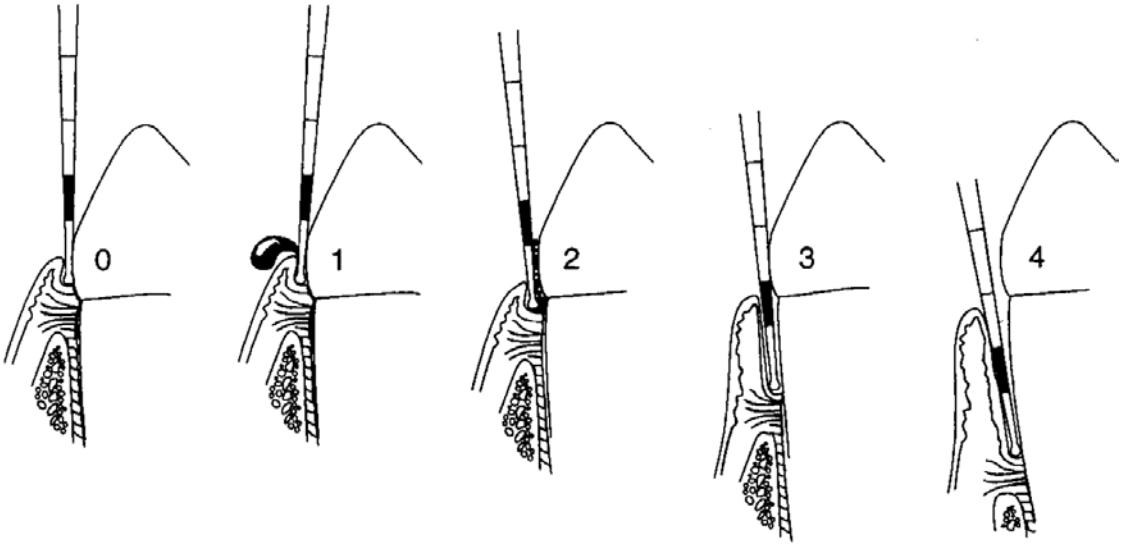

Fig. 6: Examples of coding according to the CPI, showing the position of the CPI probe[8].

5. Loss of attachment: This information was collected from index teeth in order to obtain an estimate of the lifetime accumulated destruction of the

periodontal attachment by using the same rules mentioned for CPI and using the CPI probe.

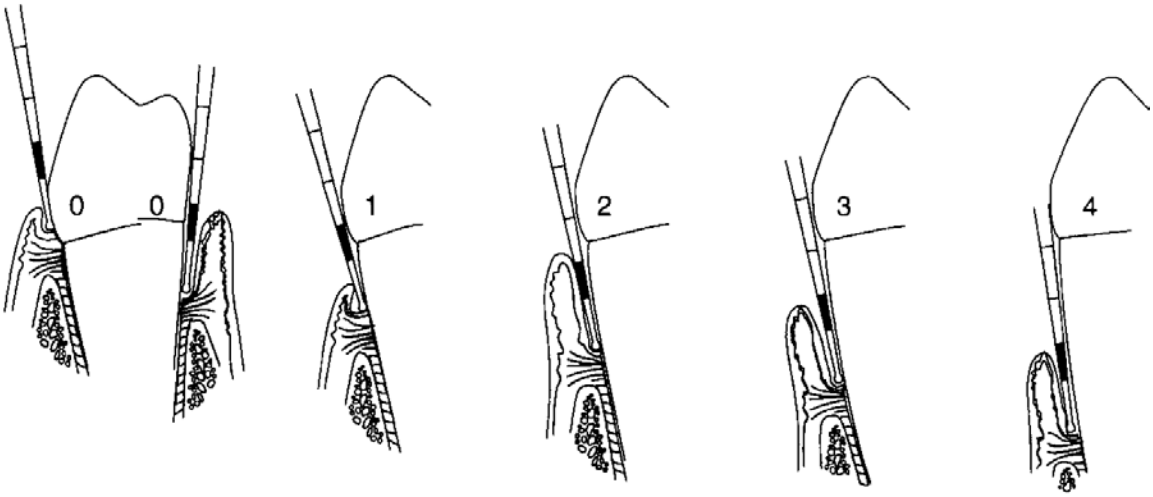

Fig. 7: Examples of coding LoA with a CPI probe[8].

6. Dental status and treatment needs: We followed a systematic approach to assess these measurements. A tooth was considered present when any part of it was visible. A code was given to each tooth regarding its diagnosis both to the crown and the root. We followed the same approach in regard to the treatment needs for each individual tooth.

   As mentioned on the 4th edition of the WHO's Oral health Surveys, "radiography for detection of approximal caries is not recommended because of the impracticability of using the equipment in all situations. Although it is realized that both this diagnostic aid will reduce the underestimation of the need for restorative care, the extra complication and frequent objections to exposure to radiation outweigh the gains to be expected"[8].

   DMFT index was used to describe the prevalence of dental caries by calculating the number of Decayed (D), Missing (M) and Filled (F) teeth. If a tooth had both a caries lesion and a filling it was calculated as D only, and if a tooth had a crown it was calculated as F.

7. State of the prosthesis: we charted if the patient was wearing any kind of prosthesis, including dentures, bridges and implant-supported dentures.

8. Prosthetic needs: we charted if the patient needed any kind of prosthesis, including bridges or dentures.

9. Frequency of brushing the teeth: we asked the patients how many times they brushed their teeth/dentures. The possible scores ranged from more than once a day to never.

10. GOHAI (General Oral Health Assessment Index)[32]: a total of 12 questions asked to the patient about their self-perception of oral health. The questions were scored from 1 to 5 using a Likert scale (always, often, sometimes, seldom, never). Of the 12 questions, 2 were positive (3 and 7) and the rest were negative. The scores for the positive ones were reversed. The final score could range from 12 to 60. We divided the patients into two groups; if they scored ≤57 they were classified as low/bad self-perception of oral health and if the score was >57 they were classified as high/good self-perception of oral health. We used this criteria as Pinzon-Pulido et al[34] could prove that values ≤57 needed treatment from a dentist in 74,4% of the cases, whereas those who score >57 didn´t need any kind of treatment from a dentist in 90% of the cases.

11. Eichner Index[39]: This index is used to know how many occlusal contacts the patient has in the 4 mastication areas (Molars left and right and premolars left and right). If the patient was wearing a removable denture, this index was assessed after removal of the denture to evaluate the occlusion with the natural dentition or fixed prosthodontics. This index is divided into 3 main groups with the letter A, B or C (main occlusal category) and each of them into sub-groups with the numbers 1, 2, 3 and 4:

    A. Occlusal contacts in the four functional zones:

A1: Occlusal contacts in the four areas of occlusion (molar and premolar zones of both sides) with natural teeth or any fixed prosthesis.

A2: Occlusal contacts in the four areas of occlusion (molar and premolar zones of both sides) with natural teeth or any fixed prosthesis but with a space of 2mm or more in one of the arches because of tooth loss.

A3: Occlusal contacts in the four areas of occlusion (molar and premolar zones of both sides) with natural teeth or any fixed prosthesis but with a space of 2mm or more in both arches because of tooth loss.

B. Occlusal contacts in less than the four functional zones:

B1: Occlusal contacts in three areas of occlusion with natural teeth or any fixed prosthesis.

B2: Occlusal contacts in two areas of occlusion with natural teeth or any fixed prosthesis.

B3: Occlusal contacts in one area of occlusion with natural teeth or any fixed prosthesis.

B4: Occlusal contact just with the anterior teeth (No molars or premolars) with natural teeth or any fixed prosthesis.

C. Absence of occlusal contacts:

C1: Absence of any kind of occlusion but there are teeth in both arches that do not occlude.

C2: Absence of any kind of occlusion but there are teeth in just one arch.

C3: Patient completely edentate.

12. Pfeiffer index[40]: we used this index to assess the cognitive capacity of a patient by asking them 10 questions. Depending on the errors of the patient we classify him or her as:
    - Without cognitive impairment: from 0 to 2 errors.
    - Slight cognitive impairment: from 3 to 4 errors.
    - Moderate cognitive impairment: from 5 to 7 errors.
    - Severe cognitive impairment: from 8 to 10 errors.

5.4 STATISTICAL ANALYSIS:

Data was entered and analysed using IBM SPSS Statistics for Windows, Version 20.0 (IBM Corp. Released 2011. Armonk, NY: IBM Corp.) statistical package.

Descriptive statistics included mean, standard deviation (SD), median, interquartile range (IQR), minimum and maximum as appropriate. For categorical variables, number and % for each category were reported. Prevalence was presented overall and by strata such as geographical location, age and gender.

To tests null hypotheses related to study objectives, t-test for independent groups, Mann-Whitney U test and Spearman's rank correlation coefficient were used depending on the type of data.

Significance level was set to 0.05.

5.5 TECHNIQUES AND INSTRUMENTS USED TO COLLECT THE DATA:

The study was developed to provide an update of the current oral health status of elderly people living in nursing homes in Catalonia.

Due to the fact that the majority of participants could not be transferred to the Dental School to carry out the examinations, the main investigator carried out all the examinations in the nursing homes.

We required a room with natural light and where all residents that wanted to take part on this investigation could be seen (this room could vary from the doctor's office to the hairdressers). Sometimes, if the participants were not able to move, we went to see them in their bedrooms.

To perform those examinations we used a frontal light on the forehead and an examination kit, with an intraoral mirror, probe and WHO periodontal probe.

After the examination took place we carried out the other two questionnaires (Pfeiffer index and GOHAI).

5.6 PROCEDURES:

The first part of the investigation involved getting the participants from the nursing homes. We selected the nursing homes at random from the guide downloaded from the webpage of the Imserso. We contacted them by phone and if they agreed to participate we sent them an agreement form where they accepted all the conditions that our ethics committee had accepted beforehand (see annex 5).

We also sent them the patient information and consent forms (see annex 2, 3 and 4), so that patients could be informed before our arrival on the day, and in case the tutor had to provide consent, that could be done.

A date was made for us to attend to carry out the examinations and we examined all candidates that volunteered to take part on the survey.

If an oral lesion, infection or any other concerns were raised during the oral examination, the director of the nursing home was informed on that same day of those findings, thus ensuring a proper treatment or referral could be given to the patient.

The investigation protocol was approved by the “CEIC: Comitè ètic d’investigació clínica” on the 23th of June 2009 (see Annex 6).

6. RESULTS:

6.1 DISTRIBUTION OF THE POPULATION:

The total number of people seen in this investigation was 635 divided into provinces, being 470 (74%) people in Barcelona, 59 (9.3%) in Girona, 42 (6.6%) in Lleida and 64 (10.1%) in Tarragona. The location of the nursing homes was classified using the WHO methodology as Urban (377 people (59.4%)), Periurban (204 people (32.1%)) and Rural (54 people (8.5%)) based on the number of population on that particular town or city.

We didn't count the number of men and women required for this survey due to the inequalities of them living in nursing homes as explained in the introduction. The percentage of male and female was 26.3% and 73.7% respectively.

The age of the population studied ranged from 65 to 102 with a mean age of 83.44 with a standard deviation of 7.652.

The distribution between provinces was done in relation to people aged 65 or over at the start of the survey (Information provided by Idescat in the year 2006).

Province	Men	Women	Total	4% error = 636
Barcelona	358098	511875	869973	470
Girona	48296	62087	110383	59
Lleida	33906	43244	77150	42
Tarragona	52262	65751	118013	64
			1175519	

Table 3: Distribution of people aged 65 or over in Catalonia in 2006 (Idescat)

Province	Gender	65 to 69 years	70 to 74 years	75 to 79 years	80 to 84 years	85 years or over
Barcelona	Men	19	13	21	20	35
	Women	12	15	38	99	198
Girona	Men	4	2	6	8	2
	Women	1	6	3	12	16
Lleida	Men	1	2	3	4	8
	Women	0	1	5	5	13
Tarragona	Men	0	1	4	4	9
	Women	1	5	9	12	19

Table 4: Number of people examined dived by group of age, gender and Province.

On table 5 we show the names of the nursing homes as well as the frequency and percentage of people visited in each of them.

Nursing home	Frequency (%)
Barcelona	
Redós de Sant Josep i Sant Pere	29 (4.6%)
Edelweiss Cubelles	21 (3.3%)
Hospital-Residència San Camilo II	58 (9.1%)
Residència Sant Josep Oriol	34 (5.4%)
Hospital de Sant Josep Baptista	27 (4.3%)
Residència Mont-Blanc	18 (2.8%)
Residència Madre Caterina Coromina	18 (2.8%)
Residència Albà – Hospital de Sant Miquel	48 (7.6%)
Residència Bruc	20 (3.1%)
Llar Girona	17 (2.7%)
Residència La Inmaculada	25 (3.9%)
Residència Sol Ponent	19 (3%)
Residència 3ª edat Vilanova	22 (3.5%)
Residència d'avis Las Magnolias	48 (7.6%)
Girona	
Hospital-Residència Josep Baulida	25 (3.9%)
Continental Residència 3ª edat	17 (2.7%)

Resdiència Geriàtrica Montsacopa	17 (2.7%)
Lleida	
Residència Municipal d'avis de Juneda	17 (2.7%)
Residèmcia Geriàtrica Sant Domènec	25 (3.9%)
Tarragona	
Novallar Cunit	17 (2.7%)
Residència Alt Camp	29 (2.8%)
Residència d'avis (El Vendrell)	18 (2.8%)

Table 5: Name of nursing home and frequency of people visited in each one of them.

The examinations were carried out between the period of June 2009 and July 2011.

6.2 EXTRA-ORAL EXAMINATION:

During the extra-oral examination 83% had no abnormalities in their extremities nor head or neck, whereas 11.8% had some kind of ulcers or erosions in those areas of the body. Just 3.5% had fissures in the corners of the mouth.

When we checked the temporomandibular joint (TMJ), we asked the patients, if they had any kind of symptoms such as occurrence of clicking, pain or difficulties in opening or closing the jaw once or more per week, and just 6.6% answered yes. During the examination of the TMJ the following signs were evaluated:

- Clicking of one or both TMJs: 32.1% of all the patients had a positive response to this.
- Tenderness on palpation of the anterior temporalis and or masseter muscles on one or both sides: 9.1% referred pain during palpation.
- Reduced jaw mobility (opening of <30mm): 33.5% had reduced mobility of the jaw.

Characteristics	**Frequency (%)**
Extra-oral examination	
Normal extra-oral appearance	527 (83%)
Ulceration, sores, erosions, fissures (head, neck, limbs)	75 (11.8%)
Ulcerations, sores, erosions, fissures (nose, cheeks, chin)	6 (0.9%)
Ulcerations, sores, erosions, fissures (commisures)	22 (3.5%)
Ulcerations, sores, erosions, fissures (vermilion border)	2 (0.3%)
Other swellings of face and jaws	3 (0.5%)
Cancrum oris	0 (0%)
Abnormalities of upper and lower lips (e.g. clefts)	0 (0%)

Enlarged lymph nodes – head, neck	0 (0%)
Temporomandibular Joint Assessment	
Symptoms	
No	504 (79.4%)
Yes	42 (6.6%)
Not recorded	89 (14%)
Signs	
Clicking	
No	345 (54.3%)
Yes	204 (32.1%)
Not recorded	87 (13.5%)
Tenderness to palpation	
No	491 (77.3%)
Yes	58 (9.1%)
Not recorded	86 (13.5%)
Reduced jaw mobility (< 30mm opening)	
No	337 (53.1%)
Yes	213 (33.5%)
Not recorded	85 (13.4%)

Table 6: Extra-oral and temporomandibular joint assessments

6.3 ORAL MUCOSA ASSESSMENT:

An examination of the oral mucosa and soft tissues in and around the mouth was made on every participant. The examination was carried out following a systematic sequence previously mentioned.

The majority of patients did not have any kind of alteration of the oral mucosa (67.7%), but 21.7% had another kind of alteration, ranging from haemangioma to fissured or geographic tongue. 3.9% had ulcers in the mouth being caused in the majority of cases by dentures that were not fitting properly. There was also another alteration of the mucosa caused by dentures which was candidiasis (3.3%), due to the patient not removing the dentures at night. In the majority of cases they were candidiasis Newton Type II. When we refer as other conditions in table 7 these involve fissured tongue, haemangioma, Geographic tongue, hairy leucoplakia, epulis fisuratum and torus.

The main sites of all the alterations of the oral mucosa were in the tongue (54.5%) followed by alveolar ridges and gums (20.5%) and hard and soft palate (11%).

Characteristics	**Frequency (%)**
Oral mucosa assessment	
No abnormal condition	430 (67.7%)
Malignant tumour (oral cancer)	4 (0.6%)
Leucoplakia	3 (0.5%)
Lichen planus	0 (0%)
Ulceration (aphtous, herpetic, traumatic)	25 (3.9%)
Acute necrotising gingivitis	5 (0.8%)
Candidiasis	21 (3.3%)
Abscess	1 (0.2%)
Other conditions	138 (21.7%)
Not recorded	8 (1.3%)

Location of oral mucosal lesions	
Vermilion border	0 (0%)
Commissures	3 (1.5%)
Lips	14 (2.2%)
Sulci	0 (0%)
Buccal mucosa	8 (4%)
Floor of the mouth	1 (0.5%)
Tongue	109 (54.5%)
Hard and/or soft palate	22 (11%)
Alveolar ridges/gingiva	41 (20.5%)
Not recorded	2 (1%)

Table 7: Oral mucosa assessment

6.4 PERIODONTAL ASSESSMENT:

The main periodontal condition was calculus on the teeth in 24.25% of the sextants, but 66.79% of all the sextants were excluded because of missing teeth. The majority of sextants included in the study had no loss of periodontal attachment (18.47%) and just 8.71% had a loss of 4 to 5mm (Table 8 and 9).

	Sextant 1	**Sextant 2**	**Sextant 3**	**Sextant 4**	**Sextant 5**	**Sextant 6**	**Total**
Healthy	15 (2.4%)	27 (4.3%)	13 (2.0%)	13 (2.0%)	14 (2.2%)	12 (1.9%)	94 (2.46%)
Bleeding	5 (0.8%)	8 (1.3%)	6 (0.9%)	2 (0.3%)	9 (1.4%)	5 (0.8%)	35 (0.91%)
Calculus	109 (17.2%)	185 (29.1%)	110 (17.3%)	148 (23.3%)	239 (37.6%)	133 (20.9%)	924 (24.25%)
Pocket (4-5mm)	16 (2.5%)	18 (2.8%)	15 (2.4%)	15 (2.4%)	24 (3.8%)	20 (3.1%)	108 (2.83%)
Pocket (6mm or above)	3 (0.5%)	3 (0.5%)	4 (0.6%)	5 (0.8%)	4 (0.6%)	5 (0.8%)	24 (0.63%)
Excluded sextant	475 (74.8%)	381 (60.0%)	473 (74.5%)	439 (69.1%)	331 (52.1%)	446 (70.2%)	2545 (66.79%)
Not recorded	12 (1.9%)	13 (2.0%)	14 (2.2%)	13 (2.0%)	14 (2.2%)	14 (2.2%)	80 (2.09%)

Table 8: CPI (Community Periodontal Index): N (%)

	Sextant 1	Sextant 2	Sextant 3	Sextant 4	Sextant 5	Sextant 6	Total
0-3 mm	83 (13.1%)	183 (28.8%)	77 (12.1%)	100 (15.7%)	165 (26.0%)	96 (15.1%)	704 (18.47%)
4-5 mm	44 (6.9%)	46 (7.2%)	53 (8.3%)	53 (8.3%)	82 (12.9%)	54 (8.5%)	332 (8.71%)
6-8 mm	8 (1.3%)	5 (0.8%)	6 (0.9%)	19 (3.0%)	22 (3.5%)	17 (2.7%)	77 (2.02%)
9-11 mm	7 (1.1%)	3 (0.5%)	6 (0.9%)	5 (0.8%)	11 (1.7%)	4 (0.6%)	36 (0.94%)
12mm or more	4 (0.6%)	2 (0.3%)	4 (0.6%)	4 (0.6%)	7 (1.1%)	3 (0.5%)	24 (0.63%)
Excluded sextant	475 (74.8%)	381 (60.0%)	473 (74.5%)	439 (69.1%)	331 (52.1%)	446 (70.2%)	2545 (66,79%)
Not recorded	14 (2.2%)	15 (2.4%)	16 (2.5%)	15 (2.4%)	17 (2.7%)	15 (2.4%)	92 (2,41%)

Table 9: Loss of Attachment: N (%)

6.5 DENTITION STATUS AND TREATMENT NEEDS:

The DMFT (Decayed, Missing and Filled Teeth) of the whole population examined for this investigation was 29.82. The number of missing teeth was 68.87%. Excluding these teeth, the state of the dental crowns was satisfactory in 54.11% of the teeth, 11.34% had caries and 12.71% of the crowns were filled.

Excluding the missing teeth, the percentage of exposed roots that had caries was 19.51% and just 0.99% of the roots were filled. The percentage of roots exposed was 43.16%. The number of retained roots was 10.81%.

In table 10 there is a detailed description of each tooth with the frequency of its dental crown and root status.

	18		17		16		15		14		13		12		11	
	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R
Sound	26 (4.1%)	27 (4.3%)	65 (10.2%)	68 (10.7%)	75 (11.8%)	86 (13.5%)	76 (12%)	69 (10.9)	95 (15.1%)	79 (12.4%)	153 (24.1%)	100 (15.7%)	142 (22.4%)	78 (12.3%)	152 (23.9%)	90 (14.2%)
Decayed	11 (1.7%)	10 (1.6%)	15 (2.4%)	26 (4.1%)	18 (2.8%)	38 (6%)	17 (2.7%)	28 (4.4%)	29 (4.6%)	43 (6.8%)	21 (3.3%)	52 (8.2%)	22 (3.5%)	52 (8.2%)	34 (5.4%)	55 (8.7%)
Filled with decay	0	0	2 (0.3%)	1 (0.2%)	2 (0.3%)	0	0	0	1 (0.2%)	0	2 (0.3%)	1 (0.2%)	6 (0.9%)	0	8 (1.3%)	1 (0.2%)
Filled, no decay	4 (0.6%)	0	13 (2.0%)	0	18 (2.8%)	1 (0.2%)	15 (2.4%)	1 (0.2%)	12 (1.9%)	0	3 (0.5%)	0	3 (0.5%)	0	3 (0.5%)	1 (0.2%)
Missing	587 (92.4%)		508 (80.0%)		479 (75.4%)		491 (77.3%)		453 (71.3%)		387 (60.9%)		400 (63%)		376 (59.2%)	
Bridge abutment, crown or implant	1 (0.2%)	0	18 (2.8%)	0	24 (3.8%)	1 (0.2%)	18 (2.8%)	0	26 (4.1%)	0	34 (5.4%)	3 (0.5%)	24 (3.8%)	1 (0.2%)	24 (3.8%)	2 (0.3%)
Unexposed root		9 (1.4%)		30 (4.7%)		26 (4.1%)		41 (6.5%)		90 (14.2%)		90 (14.2%)		100 (15.7%)		107 (16.9%)
Fracture / retained roots	5 (0.8%)		12 (1.9%)		17 (2.7%)		16 (2.5%)		17 (2.7%)		33 (5.2%)		37 (5.8%)		37 (5.8%)	
Not recorded	1 (0.2%)	589 (92.8%)	2 (0.3%)	510 (80.3%)	2 (0.3%)	483 (76.1%)	2 (0.3%)	496 (78.1%)	1 (0.2%)	405 (63.7%)	2 (0.3%)	389 (61.3%)	1 (0.2%)	404 (63.6%)	1 (0.2%)	379 (59.7%)

	21		22		23		24		25		26		27		28	
	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R
Sound	146 (23%)	90 (14.2%)	133 (20.9%)	77 (12.1%)	132 (20.8%)	88 (13.9%)	88 (13.9%)	70 (11%)	79 (12.4%)	64 (10.1%)	64 (10.1%)	70 (11%)	54 (8.5%)	59 (9.3%)	18 (2.8%)	24 (3.8%)
Decayed	26 (4.1%)	47 (7.4%)	21 (3.3%)	47 (7.4%)	18 (2.8%)	44 (6.9%)	23 (3.6%)	44 (6.9%)	23 (3.6%)	31 (4.9%)	24 (3.8%)	31 (4.9%)	18 (2.8%)	22 (3.5%)	13 (2%)	12 (1.9%)
Filled with decay	7 (1.1%)	2 (0.3%)	8 (1.3%)	1 (0.2%)	4 (0.6%)	0	0	0	1 (0.2%)	0	5 (0.8%)	0	4 (0.6%)	0	0	0
Filled, no decay	6 (0.9%)	2 (0.3%)	2 (0.3%)	2 (0.3%)	3 (0.5%)	2 (0.3%)	9 (1.4%)	1 (0.2%)	7 (1.1%)	1 (0.2%)	23 (3.6%)	1 (0.2%)	9 (1.4%)	0	6 (0.9%)	0
Missing	387 (60.9%)		109 (64.4%)		417 (65.7%)		469 (73.9%)		491 (77.3%)		491 (77.3%)		524 (82.5%)		592 (93.2%)	
Bridge abutment, crown or implant	22 (3.5%)	3 (0.5%)	22 (3.5%)	0	33 (5.2%)	2 (0.3%)	22 (3.5%)	0	18 (2.8%)	0	14 (2.2%)	0	15 (2.4%)	0	0	1 (0.2%)
Unexposed root		95 (15%)		95 (15%)		80 (12.6%)		47 (7.4%)		43 (6.8%)		27 (5.8%)		27 (4.3%)		7 (1.1%)
Fracture / retained roots	37 (5.8%)		39 (6.1%)		27 (4.3%)		22 (3.5%)		13 (2%)		12 (1.9%)		9 (1.4%)		5 (0.8%)	
Not recorded	1 (0.2%)	390 (61.4%)	1 (0.2%)	413 (65%)	1 (0.2%)	413 (65%)	2 (0.3%)	473 (74.5%)	3 (0.5%)	496 (78.1%)	2 (0.3%)	496 (78.1%)	2 (0.3%)	527 (83%)	1 (0.2%)	591 (93.1%)

	48		47		46		45		44		43		42		41	
	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R
Sound	25 (3.9%)	39 (9.9%)	43 (6.8%)	63 (9.9%)	48 (7.6%)	60 (9.4%)	115 (18.1%)	100 (15.7%)	181 (28.5%)	145 (22.8%)	222 (35%)	154 (24.3%)	214 (33.7%)	133 (20.9%)	194 (30.6%)	116 (18.3%)
Decayed	22 (3.5%)	23 (3.6%)	20 (3.1%)	23 (3.6%)	17 (2.7%)	19 (3%)	22 (3.5%)	46 (7.2%)	24 (3.8%)	59 (9.3%)	23 (3.6%)	62 (9.8%)	17 (2.7%)	49 (7.7%)	11 (1.7%)	39 (6.1%)
Filled with decay	2 (0.3%)	0	5 (0.8%)	0	6 (0.9%)	0	1 (0.2%)	0	2 (0.3%)	0	3 (0.5%)	3 (0.5%)	1 (0.2%)	0	1 (0.2%)	0
Filled, no decay	7 (1.1%)	0	15 (2.4%)	1 (0.2%)	12 (1.9%)	0	10 (1.6%)		12 (1.9%)	0	0	2 (0.3%)	2 (0.3%)	2 (0.3%)	1 (0.2%)	0
Missing	563 (88.7%)		518 (81.6%)		534 (84.1%)		438 (69%)	1 (0.2%)	367 (57.8%)		327 (51.5%)		363 (57.2%)		390 (61.4%)	
Bridge abutment, crown or implant	5 (0.8%)	0	17 (2.7%)	1 (0.2%)	6 (0.9%)	1 (0.2%)	22 (3.5%)	2 (0.3%)	25 (3.9%)	2 (0.3%)	32 (5%)	2 (0.3%)	14 (2.2%)	1 (0.2%)	10 (1.6%)	1 (0.2%)
Unexposed root		16 (2.5%)		26 (4.1%)		16 (2.5%)		41 (6.5%)		57 (9.0%)		78 (12.3%)		79 (12.4%)		82 (12.9%)
Fracture / retained roots	10 (1.6%)		16 (2.5%)		11 (1.7%)		25 (3.9%)		22 (3.5%)		26 (4.1%)		22 (3.5%)		26 (4.1%)	
Not recorded	1 (0.2%)	563 (88.6%)	1 (0.2%)	521 (82%)	1 (0.2%)	520 (81.9%)	2 (0.3%)	445 (70.1%)	2 (0.3%)	372 (58.6%)	2 (0.3)	334 (52.6%)	2 (0.3%)	371 (58.4%)	2 (0.3%)	397 (62.5%)

	31		32		33		34		35		36		37		38	
	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R
Sound	193 (30.4%)	113 (17.8%)	209 (32.9%)	132 (20.8%)	233 (36.7%)	164 (25.8%)	176 (27.7%)	139 (21.9%)	112 (17.6%)	98 (15.4%)	48 (7.6%)	57 (9%)	40 (6.3%)	52 (8.2%)	22 (3.5%)	26 (4.1%)
Decayed	13 (2.0%)	42 (6.6%)	17 (2.7%)	49 (7.7%)	15 (2.4%)	55 (8.7%)	25 (3.9%)	55 (8.7%)	19 (3%)	45 (7.1%)	19 (3%)	27 (4.3%)	15 (2.4%)	23 (3.6%)	9 (1.4%)	17 (2.7%)
Filled with decay	1 (0.2%)	1 (0.2%)	1 (0.2%)	1 (0.2%)	4 (0.6%)	3 (0.5%)	4 (0.6%)	1 (0.2%)	5 (0.8%)	0	5 (0.8%)	1 (0.2%)	5 (0.8%)	0	0	0
Filled, no decay	0	1 (0.2%)	0	1 (0.2%)	2 (0.3%)	1 (0.2%)	4 (0.6%)	4 (0.6%)	4 (0.6%)	1 (0.2%)	9 (1.4%)	3 (0.5%)	12 (1.9%)	2 (0.3%)	3 (0.5%)	1 (0.2%)
Missing	389 (61.3%)		356 (56.1%)		322 (50.7%)		372 (58.06%)		445 (70.1%)		527 (83%)		533 (83.9%)		582 (91.7%)	
Bridge abutment, crown or implant	7 (1.1%)	0	20 (3.1%)	2 (0.3%)	32 (5%)	3 (0.5%)	19 (3%)	1 (0.2%)	22 (3.5%)	0	8 (1.3%)	1 (0.2%)	15 (2.4%)	1 (0.2%)	3 (0.5%)	0
Unexposed root		82 (12.9%)		87 (13.7%)		80 (12.6%)		59 (9.3%)		42 (6.6%)		18 (2.8%)		23 (3.6%)		11 (1.7%)
Fracture / retained roots	30 (4.7%)		29 (4.6%)		25 (3.9%)		33 (5.2%)		26 (4.1%)		18 (2.8%)		13 (2%)		14 (2.2%)	
Not recorded	2 (0.3%)	395 (62.2%)	3 (0.5%)	363 (57.1%)	2 (0.3%)	326 (51.3%)	2 (0.3%)	376 (59.2%)	2 (0.3%)	449 (70.7%)	1 (0.2%)	528 (83.1%)	2 (0.3%)	534 (84.1%)	2 (0.3%)	580 (91.3%)

Table 10: Dentition status per tooth. C (Crown), R (Root) N (%)

The main treatment need was extractions in 16.14% of the teeth followed by fillings in 13.82%. A big percentage of the teeth did not require any treatment (67.84%) (Table 11).

	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
None	28 (59.6%)	84 (67.7%)	98 (65.3%)	96 (68.1%)	117 (65%)	175 (70.9%)	160 (69%)	168 (65.6%)	167 (68.7%)	149 (66.2%)	154 (71%)	101 (62%)	90 (64.3%)	88 (62.9%)	72 (66.6%)	21 (48.8%)
Preventive	0	1 (0.8%)	0	0	0	0	0	0	0	0	0	0	0	0	2 (1.8%)	0
One surface filling	8 (17%)	14 (11.3%)	14 (9.3%)	18 (12.8%)	26 (14.4%)	23 (9.3%)	17 (7.3%)	28 (10.9%)	18 (7.4%)	20 (8.9%)	19 (8.8%)	20 (12.3%)	23 (16.4%)	20 (14.3%)	12 (11.1%)	9 (20.9%)
Two or more surface fillings	2 (4.3%)	6 (4.8%)	6 (4%)	6 (4.3%)	8 (4.4%)	7 (2.8%)	8 (3.4%)	10 (3.9%)	10 (4.1%)	7 (3.1%)	8 (3.7%)	7 (4.3%)	2 (1.4%)	5 (3.6%)	6 (5.5%)	3 (7%)
Crown	0	0	0	2 (1.4	1 (0.6	0	0	1 (0.4	0	1 (0.4	0	1 (0.6	1 (0.7	1 (0.7	1 (0.9	0

				%)	%)			%)		%)		%)	%)	%)	%)	
Veneer	0	0	0	0	0	0	1 (0.4 %)	0	0	0	0	0	0	0	0	0
Pulp care and restoration	0	0	0	0	2 (1.1 %)	2 (0.8 %)	3 (1.3 %)	2 (0.8 %)	5 (2.1 %)	4 (2.2 %)	3 (1.4 %)	2 (1.2 %)	2 (1.4 %)	2 (1.4 %)	1 (0.9 %)	0
Extraction	8 (17 %)	18 (14.5%)	30 (20 %)	18 (12.8%)	24 (13.3%)	38 (15.4%)	41 (17.7%)	45 (17.6%)	41 (16.9%)	41 (18.2%)	31 (14.3%)	30 (18.4%)	20 (14.3%)	22 (15.7%)	13 (12 %)	9 (20.9 %)
Not recorded	1 (2.1 %)	1 (0.8 %)	2 (1.3 %)	1 (0.7 %)	2 (1.1 %)	2 (0.8 %)	2 (0.9 %)	2 (0.8 %)	2 (0.8 %)	2 (0.9 %)	2 (0.9 %)	2 (1.2 %)	2 (1.4 %)	2 (1.4 %)	2 (1.8 %)	1 (2.3 %)

	48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
None	38 (52.8%)	67 (58.3%)	56 (57.1%)	122 (63.5%)	183 (69.6%)	218 (72.2%)	199 (74.5%)	181 (74.8%)	182 (75.2%)	207 (75.5%)	231 (74.2%)	178 (69 %)	119 (63.6%)	54 (50.9%)	61 (61.6%)	28 (52.8 %)
Preventive	0	0	0	0	0	0	0	0	0	0	1 (0.3 %)	0	0	0	0	0
One surface filling	14 (19.4%)	17 (14.8%)	18 (18.4%)	22 (11.5%)	26 (9.9 %)	27 (8.9 %)	22 (8.2 %)	15 (6.2 %)	14 (5.8 %)	18 (6.6 %)	27 (8.6 %)	26 (10.1%)	28 (15 %)	17 (16 %)	13 (13.1%)	5 (9.4 %)
Two or more surface fillings	3 (4.2 %)	6 (5.2 %)	4 (4.1 %)	9 (4.7 %)	14 (5.3 %)	11 (3.6 %)	5 (1.9 %)	1 (0.4 %)	2 (0.8 %)	5 (1.8 %)	4 (1.2 %)	10 (3.9 %)	6 (3.2 %)	8 (7.5 %)	4 (4%)	1 (1.9 %)
Crown	0	0	0	0	0	1 (0.3 %)	2 (0.7 %)	1 (0.4 %)	1 (0.4 %)	1 (0.4 %)	1 (0.3 %)	1 (0.4 %)	1 (0.5 %)	0	0	0
Veneer	0	0	0	0	0	0	0	1 (0.4 %)	0	0	0	0	0	0	0	0
Pulp care and restoration	0	1 (0.9 %)	1 (1%)	1 (05 %)	0	0	2 (0.7 %)	1 (0.4 %)	1 (0.4 %)	1 (0.4 %)	2 (0.6 %)	1 (0.4 %)	4 (2.1 %)	2 (1.9 %)	2 (2%)	0
Extraction	16 (22.2%)	22 (19.1%)	18 (18.4%)	35 (18.2%)	37 (5.8 %)	43 (14.2%)	35 (13.1%)	40 (16.5%)	40 (16.5%)	10 (14.6%)	42 (13.5%)	41 (15.9%)	28 (15 %)	24 (22.6%)	18 (18.2%)	18 (34 %)
Not recorded	1 (1.4 %)	2 (1.7 %)	1 (1%)	3 (1.6 %)	3 (0.5 %)	2 (0.7 %)	2 (0.7 %)	2 (0.8)	2 (0.8 %)	2 (0.7 %)	3 (0.9 %)	1 (0.4 %)	1 (0.5 %)	1 (0.9 %)	1 (1%)	1 (1.9 %)

Table 11: Treatment needs per tooth N (%)

6.6 PROSTHETIC STATUS AND PROSTHETIC NEEDS:

When we checked the status of the dental prosthesis the number or people not wearing any kind of dentures were 43.8% for the maxilla and 52.4% for the mandible. The main prostheses seen on patients were complete dentures for both arches (30.1% for the upper and 23.1% for the lower) followed by partial dentures (15.3% upper and 16.2% lower) (Table 12).

Characteristics	**Frequency (%)**	
	Upper	**Lower**
No prosthesis	278 (43.8%)	333 (52.4%)
Bridge	25 (3.9%)	16 (2.5%)
More than one bridge	26 (4.1%)	19 (3%)
Partial denture	97 (15.3%)	103 (16.2%)
Both bridge and partial denture	11 (1.7%)	9 (1.4%)
Full removable denture	191 (30.1%)	147 (23.1%)
Fixed implant prosthesis	3 (0.5%)	4 (0.6%)
Removable implant prosthesis	0	0
Not recorded	4 (0.6%)	4 (0.6%)

Table 12: Prosthetic status on the upper and lower arch N (%)

The number of patients that did not need any kind of prosthesis was 75.9% for the maxilla and 74.5% for the mandible. The patients mainly needed partial dentures (10.7% for the maxilla and 13.2% for the mandible) and complete dentures (11.7% for the upper and 11.2% for the lower) (Table 13).

Characteristics	Frequency (%)	
	Upper	**Lower**
No prosthesis needed	482 (75.9%)	473 (74.5%)
Needed for one-unit prosthesis	4 (0.6%)	1 (0.2%)
Needed for multi-unit prosthesis	68 (10.7%)	84 (13.2%)
Needed for combination of one and/or multi-unit prosthesis	4 (0.6%)	3 (0.5%)
Needed for full prosthesis	74 (11.7%)	71 (11.2%)
Not recorded	3 (0.5%)	3 (0.5%)

Table 13: Prosthetic needs on the upper and lower arch N (%)

6.7 FREQUENCY OF TOOTH-BRUSHING/DENTURE CLEANING:

We also wanted to investigate the frequency of brushing their teeth or dentures and 28.2% said they brushed more than once a day and 33.4% said that they just only brushed them once a day. Surprisingly, 14.3% said that they never brushed their teeth (Table 14).

Characteristics	**Frequency (%)**
More than once a day	179 (28.2%)
Once a day	212 (33.4%)
At least once a week	56 (8.8%)
Less than once a week	22 (3.5%)
Never	91 (14.3%)
Not recorded	75 (11.8%)

Table 14: Frequency of tooth-brushing/denture cleaning N (%)

We wanted to compare if there was any correlation between the frequency of tooth-brushing and CPI. We did that by getting the worst measurement of CPI and excluding those patients with all sextant missing or those patients that we could not register the measurements. We found that there was a significant correlation between both variables, meaning that those patients that brushed their teeth less often had worse periodontal problems as shown in table 15 and 16.

CPI Worst measurement	**Frequency of tooth-brushing**				
	More than once a day	Once a day	At least once a week	Less than once a week	Never
Healthy	9 (8.1%)	0	0	0	0
Bleeding	4 (3.6%)	0	0	0	0
Calculus	79 (71.2%)	89 (70.1%)	28 (75.7%)	6 (60%)	29 (76.3%)

Pocket 4-5 mm	14 (12.6%)	31 (24.4%)	7 (18.9%)	4 (40%)	4 (10.5%)
Pocket 6mm or above	5 (4.5%)	7 (5.5%)	2 (5.4%)	0	5 (13.2%)

Table 15: CPI Worst measurement cross tabulated with frequency of tooth-brushing. (% with frequency of tooth-brushing)

Statistical test			Frequency of tooth-brushing
Spearman's rho	CPI Worst measurement	Correlation Coefficient Sig (2-tailed) N	.0164 0.003 323

Table 16: Correlation between Frequency of tooth-brushing and CPI worst measurement. The correlation is significant at the 0.01 level (2-tailed)

6.8 EICHNER INDEX:

Eichner index revealed that the majority of patients were completely edentate 33.5% (C3) and just 3.8% had all their teeth (A1). The majority of people assessed in this survey showed that they had absence of occlusal contact as shown in Table 17.

Characteristics	Frequency (%)
A1	24 (3.8%)
A2	28 (4.4%)
A3	26 (4.1%)
B1	36 (5.7%)
B2	38 (6%)
B3	31 (4.9%)
B4	6 (0.9%)
C1	110 (17.3%)
C2	123 (19.4%)
C3	213 (33.5%)

Table 17: Eichner index N (%)

We also compared edentulous patient versus non edentulous in relation to their age and found that there was not a significant correlation between these two variables (p=0.316) as shown in table 18.

Variable	Not edentulous	Edentulous	Statistical test
Age Mean (SD)	83.22 (7.481)	83.87 (7.976)	***Student t-test*** P= 0.316

Table 18: Comparison of edentulousness and age.

6.9 COGNITIVE IMPAIRMENT:

The evaluation of their cognitive impairment was done using the Pfeiffer index. The results revealed that 22.7% had a score of 10 while 10.1% score a 0, followed by a score of 3 with 10.2% of the population (Table 19).

As a summary the percentage of patients that didn't have cognitive impairment (0 to 2 errors) was 27.6%, slight cognitive impairment (3 to 4 errors) was 18.7, moderate cognitive impairment (5 to 7 errors) was 18.1% and with severe cognitive impairment (8 to 10 errors) was 35.6%.

Characteristics	Frequency (%)
0	64 (10.1%)
1	54 (8.5%)
2	57 (9.0%)
3	65 (10.2%)
4	54 (8.5%)
5	41 (6.5%)
6	44 (6.9%)
7	30 (4.7%)
8	45 (7.1%)
9	37 (5.8%)
10	144 (22.7%)

Table 19: Pfeiffer index (cognitive status) N (%)

We also wanted to compare their cognitive impairment with the frequency of tooth-brushing and we found a correlation between both variables meaning that as their cognitive impairment got worse, their frequency of brushing their teeth decreased. We also found a correlation between cognitive impairment and Eichner index as well as DMFT, meaning that as their cognitive impairment was getting worse, the number of occlusal contact decreased and their DMFT increased. No correlation was found between Pfeiffer index and CPI (table 20).

		Pfeiffer
Frequency of tooth-brushing	Correlation Coefficient Sig (2-tailed) N	.0319 <0.001 560
Eichner Index	Correlation Coefficient Sig (2-tailed)	.0131 0.001
DMFT	Correlation Coefficient Sig (2-tailed)	.0117 0.003
CPI Worst measurement	Correlation Coefficient Sig (2-tailed) N	.063 0.240 352

Table 20: Spearman's correlation between Pfeiffer and frequency of tooth-brushing, Eichner index, DMFT and CPI worst measurement. The correlation is significant at the 0.01 level (2-tailed) (N=635, unless otherwise stated).

6.10 GOHAI (GENERAL ORAL HEALTH ASSESSMENT INDEX):

During the evaluation of the GOHAI, 41.9% of them had a bad self-perception of oral health (scoring ≤ 57) and 29.9% had a good self-perception of oral health (scoring > 57), the rest of the patients could not answer correctly the test, mainly due to cognitive impairment (Table 21).

Characteristics	Frequency (%)
≤ 57	266 (41.9%)
> 57	190 (29.9%)
Not recorded	179 (28.2%)

Table 21: GOHAI assessment N (%)

We wanted to compare if the self-perception of a patient had any correlation with the dental characteristics of the patients and we found that DMFT index, Prosthetic needs and Eichner Index had a statistical correlation, meaning that those patients that had more caries, fillings and/or missing teeth, that required some sort of prosthodontics and had less or no occlusal contacts had a lower self-perception of their own oral health (Table 22).

Variable	**GOHAI**		**Statistical test (p-value)**
	≤ 57 N (%)*	**>57 N (%)***	
Age Mean (SD)	83.2 (7.5)	83.5 (7.0)	***Student t-test*** P= 0.616
Gender Female Male	156 (58.3) 70 (58.3%)	140 (41.7%) 50 (41.7%)	***Chi-Square*** P= 1.0
Pfeiffer index Median (IQR) (Minimum, maximum)	3 (5) (0, 10)	4 (4) (0, 10)	***Mann-Whitney*** P= 0.074
DMFT index Median (IQR) (Minimum, maximum)	30 (9) (4, 32)	28.50 (13) (1, 32)	***Mann-Whitney*** P= 0.040
Prosthetic status ***Upper*** Median (IQR) (Minimum, maximum) ***Lower*** Media (IQR)	 3 (5) (0, 6) 2 (5)	 3 (5) (0, 6) 3 (5)	***Mann- Whitney*** P= 0.980 P= 0.638

(Minimum, maximum)	(0, 6)	(0, 6)	
Prosthetic needs			***Mann-Whitney***
Upper			P= 0.053
Median (IQR)	0 (2)	0 (0)	
(Minimum, maximum)	(0, 4)	(0, 4)	
Lower			P= 0.009
Median (IQR)	0 (2)	0 (0)	
(Minimum, maximum)	(0, 4)	(0, 4)	
Frequency of tooth-brushing			***Mann-Whitney*** P= 0.918
Median (IQR)	2 (2)	2 (1)	
(Minimum, maximum)	(1, 5)	(1, 5)	
Simplified Eichner Index			***Mann-Whitney*** P= 0.001
Median (IQR)	3 (1)	3 (1)	
(Minimum, maximum)	(1, 3)	(1, 3)	
Eichner			***Mann-Whitney***
Median (IQR)	C2 (A3)	C1 (B2)	P= 0.042
(Minimum, Maximum)	(A1, C3)	(A1, C3)	

Table 22: Comparison of GOHAI and age, gender, Pfeiffer index, DMFT index, Prosthetic status, prosthetic needs, frequency of tooth-brushing and Eichner in its simplified or normal form. *N (%) unless otherwise specified.

When we compared all GOHAI results with the periodontal condition we took the worst measurement from each patient and removed from the statistical analysis those sextants that were excluded or not recorded (see table 23). The distribution of both CPI and Loss of Attachment was the same across both categories of GOHAI.

Variable	**GOHAI**		**Statistical test (p-value)**
	≤ 57 N (%)	**>57 N (%)**	
CPI Worst measurement			***Mann-Whitney*** P= 0.099
0	5 (3.2%)	3 (2.6%)	
1	4 (2.5%)	0 (0%)	
2	117 (74.1%)	80 (69.6%)	
3	24 (15.2%)	26 (22.6%)	
4	8 (5.1%)	6 (5.2%)	

LoA worst measurement			***Man-Whitney*** P= 0.948
0	62 (39.5%)	46 (40%)	
1	61 (38.9%)	44 (38.3%)	
2	21 (13.4%)	16 (13.9%)	
3	9 (5.7%)	6 (5.2%)	
4	4 (2.5%)	3 (2.6%)	

Table 23: Comparison of GOHAI and CPI and LoA (N (%)).

7. DISCUSSION:

As means to facilitate the discussion of our results we have divided this part into different subheadings in order to clarify concepts.

In a first instance we will be analysing the caries index and compare our results with previous surveys. Then we will analyse the periodontal health of the elderly patients followed by the number of patients that are edentulous. This will take us to describe the prosthesis status and their needs for new prosthesis taking into account the number of occluding teeth.

We will continue to check the oral health habits, the TMJ and oral mucosa disorders and the relationship between the cognitive impairment and oral health. Finally we will evaluate the self-perception on patients regarding their own oral health and its relation with oral health index such as caries and edentulism and compare what other authors found on their researches.

7.1 SITUATION OF CARIES AND EDENTULISM:

Our survey shows that there is still a big percentage of edentulous patients 33.5%, which is similar to the survey done in the same region of Spain 18 years ago by Puigdollers[2,3] where there were 37% of edentulous patients. Other studies done in different areas of Spain have found the percentage of edentulism ranging from 36.6% to 53%[4-7,41-46]. Even in mixed studies with patients randomly selected from primary care clinics and institutions, 31% of the population were edentulous[47,48]. This average is similar in international studies, where institutionalised elders suffer from edentulism between 25.5% and 54.4%[30,49-54] and this percentage increases to 52.5% in totally dependent elderly people[52]. Because of the big proportion of edentulous patients, the DMFT is usually very high mainly because of missing teeth. In this research we found a DMFT index of 29.82, similar to other Spanish studies where the DMFT went from 22.4 to 29.19 [3-7,41-43] and it ranged from 28.3 to 30.8 in an older psychiatric population[43,44]; whereas in international studies the DMFT was between 22.2 and 28.8[30,45,53]. The average number of remaining teeth ranged from 4.59 to 8.4[3,4,6,27,28,42]. Similar to our study where the main component of the DMFT was missing teeth (68.87%), the study done in Vigo also had the component missing teeth at 76.7%[41]. These results are very distant to those proposed by WHO to be reached in 2020 where they expect to have less than 13% of patients edentulous and a DMFT index of 13.5 or less[26].

As proposed by Eustaquio-Raga[46], the reason why there is greater risk of tooth loss in an older adult population in Spain is because dental care has traditionally been almost entirely private and the public health service has been confined to diagnosis and pain-relief (prescriptions and extractions). However, this problem is not only affecting Spain, many other European countries experience the same problem with institutionalised elders and they suggest that this situation has not improved much in the last years as recently published by Müller et al in a review paper[55].

All studies suggest that the proportion of edentulous patients increases significantly with age and with institutionalization[46,48,55], followed by educational

levels[56] and not visiting the dentist regularly[57], resulting in variable degrees of oral disability or incapacitation, leading to malnutrition[48]. In contrast, our study didn't show any correlation between age and edentulous patient. Joshipura et al observed that edentulous patients consumed fewer vegetables, less fibre and carotene, and more cholesterol, saturated fat and calories than those participants that had 25 or more teeth[58].

Root caries is very prevalent in the elderly population due to recession of the gums. We proved in this study where the percentage of exposed roots that had caries was 19.51% with a very low proportion of those being filled (0.99%), This variable is presented in different nomenclature depending on the type of study done, making it very difficult to compare. However, other studies found that the percentage of people with radicular caries ranged from 36% to 53%[3,5,59-61], with more than 90%[5] of these caries not being treated, making it a very prevalent condition in the institutionalised elder.

Philip et al[53] also concluded on their research that those patients living in nursing homes with an ADLOH (Activities of Daily Living Oral Health) score of "unable" had higher prevalence of carious retained roots. Velasco et al[42] already suggested that geropsychiatric patients are too immersed in their inner world to take daily time to perform oral hygiene. Moreover due to the drugs they take, they are more prone to have xerostomia[4,42] and as a result they would be more prone to caries.

The treatment needs of this population is mainly fillings and extractions and the mean number of teeth requiring these treatments ranged from 0.2 to 2.9 for fillings and 1.4 to 3.9 for extractions[3,4,52,62]. Ortolà et al[5], found that 57% of the dentate population required at least one extraction.

Sometimes the decision regarding what is the best treatment for a particular patient living in a nursing home can be very difficult to make, but Ettinger[63] already said that the decision has to be taken with the previous knowledge of the oral and general health of the elderly patient and not to be influenced by the negative stereotype of ageing.

Other authors have suggested that there should be preventive measures implemented in the nursing homes such as fluoride or chlorhexidine varnishes to control cariogenic dental plaque and as a result promote the remineralisation of previous lesions[43]. By executing these measures dental professionals, both dentists and dental hygienists, would need to be more involved within the nursing homes[59].

7.2 ANALYSIS OF THE PERIODONTAL HEALTH AND ORAL HEALTH HABITS:

The main periodontal condition found in the institutionalised elderly people was calculus 24.25% (Code 2 on the CPI), and comparing it with other studies (not taking into account the excluded sextants) the presence of calculus ranged from 44.7% to 65.3%[4,5,7,46,50,64-65]. However on a more recent study done in Vigo[41], 71% of the sextant were excluded, and from the remaining sextants, 13.3% had bleeding on probing and 11.6% had calculus. These results are very similar to a Brazilian study[33] where 64.4% of the sextants were excluded and 18.6% of the remaining sextants had calculus. Other studies that did not use the CPI and used the plaque and gingival index instead, found that the plaque index was 2.3[61,66] and the gingival index ranged from 1.6 to 1.7[61.66]. Wu et al[64] described that 70.97% of their study population had periodontitis and Ritchie et al[49] found that 86% of the elderly population investigated had gingival bleeding, in contrast to Kayak et al[59] where they found that only 42.9% had bleeding on probing, but just 4% of them had gingival recession greater than 3mm.

A study done with geropsychiatric patients[43] found similar results were calculus was the most prevalent condition (20.9%). They also found that as the age of the patient increased, so did the deeper pockets, from 2.9% on the younger cohort (65-69) to 21.4% on the over 80s. They also concluded that due to the high number of patients with periodontal disease, this reflected the increased demands for periodontal treatment, mainly oral hygiene instructions (96.6% of the dentate population) and basic periodontal treatment (scale and polish and basic root surface instrumentation on 90.9% of the dentate patients).

Our study showed that more than 50% of the elderly brushed their teeth or denture once a day or more than once a day, but alarmingly 14.3% of the population never brushed their teeth. Frequency of brushing the teeth had very different answers depending on the article we checked. For instance Akar et al[67] concluded that 31.9% brushed their teeth three times a day and 31.7% never brushed their teeth, whereas Pinzón et al[34] said that only 12% never brushed their teeth which is similar to the results we found.

When comparing this variable with periodontal index on our study, we could find a weak but significant correlation between the two of them. This would imply that if the oral health conditions of the elderly could be improved, their periodontal condition would be better, and as a result they would be able to retain their own teeth for longer. As Kalk et al[68] said, one of the most important criteria to age with success is to be able to retain a healthy and functional natural dentition, because this would offer biological and aesthetic benefits as well as being able to eat, savour and talk without problems. This would also give psychological and social benefits such as improving the self-esteem and the ability to talk to other people.

Some researchers have already studied how oral health is provided in nursing homes and they have found that usually caregivers find oral care activities to be an unpleasant task[69] and if done, they usually deliver it inappropriately[70]. In a recent study conducted in Barcelona, they wanted to describe the specific activities of oral health care performed by caregivers to the elderly; they found that the frequency of brushing teeth was significantly associated with the caregivers having specific training in oral health. The importance of their own oral health care and the one put towards the elderly, this was met by knowing the existence of protocols and meeting those. In contrast, those caregivers that performed oral hygiene less frequently than once a day were significantly associated with not fully agreeing on the importance of oral health care for the elderly even thought they knew of the existence of institutional protocols[71]; these protocols are based on the Spanish normative protocols that state the benefits of frequent tooth brushing performed at least once a day, for institutionalized elders in long-term care facilities[1].

Because of all these reasons, in 2011 the Dutch Association of Nursing Home Physicians developed the oral health care guidelines for older people in long-term care institutions[72]. On this document they acknowledge the importance of an integrated oral health care as well as tailored-made for the individual nursing care of every resident. They also explain the importance of having a “ward oral health care organiser” who monitors the adherence of the nursing staff to this protocol, and also includes a very important key point on continuous education of nursing staff and continuous monitoring of the guidelines implementation.

However, they also highlighted the need for more research on oral health on this particular population because the majority of recommendations are based on expert opinions and only four of them as based on evidence level A2.

We would like to highlight the importance of continuous education because on a study done in Germany where they wanted to evaluate different interventions to improve oral hygiene amongst elderly institutionalised patients, they found that during the 12 week period that lasted the study, all the groups that included some sort of intervention improved on the oral health scores (plaque, bleeding on proving and denture hygiene indices); however on a 3 year follow up, they found that all those scores where even worse that at the beginning of the survey, making them reach the conclusion that a single intervention didn't have a big effect in the long term[73].

7.3 EVALUATION OF THE PROSTHETIC STATUS AND NEEDS ITS RELATION TO THE NUMBER OF OCCLUDING PAIRS:

The majority of patients in our study didn´t wear any type of dentures, but from those who did, removable dentures were the most prevalent (complete dentures: 30.1% for the upper and 23.1% for the lower, followed by partial dentures: 15.3% upper and 16.2% lower). In regards to prosthesis needs, it was again removable dentures the most prevalent need (partial dentures needs: 10.7% for the maxilla and 13.2% for the mandible and complete dentures needs: 11.7% for the upper and 11.2% for the lower).

However, when comparing the use of dentures with other studies we found a big variety of results. Cortés et al[42], showed that 70.8% of their study population wore some kind of dentures, from which 35.7% used a set of complete dentures and 11.4% a removable partial denture in both arches, which are very similar to the results from Iglesias-Corchero et al[41] where 40% used a complete set of dentures. In the survey done by Velasco et al[43], just 28.2% of the edentulous patients were wearing a set of complete dentures, and 89.3% needed some kind of removable dentures. Whereas in the study from Ortolá et al[5], 71.8% of the edentulous used a set of complete dentures. Pinzón et al[6] on the other hand had a very low use of dentures, being 5.8% of patient wearing partial removable dentures and 14.9% a complete set of dentures. Other international studies have also disparities in the use and/or needs for prosthesis; Piuvezman et al[33] described that 40.9% of their study population wore full upper dentures and 21.6% full lower; from those needing dentures, they reported that 38.5% required full upper dentures and 14.1% some type of fixed or removal partial denture, and in the lower arch, 43.8% required full dentures and 27.9% some sort of fixed or removable partial denture. Ritchie et al[49] described that 75% of the edentulous patients wore complete dentures while Bush et al[52] stated that 89.5% of them wore a set of complete dentures, but only 51.5% of the dentate population was wearing a partial removable dentures; from those who wore dentures, 61.7% had had their current set of dentures for more than a decade. Morishita et al[66] carried out a study to compare the use of dentures depending on the dependency of the patient in doing the basic activities of daily living. 74.4% of those who were completely

independent always used the dentures while only the 51.1% of the bed-bound patients always used them. Akar et al[67] in the other hand concluded that 59.4% were wearing some kind of dentures, and amongst these 78.3% had complete dentures and 6.6% removable partial dentures. Also Schmitter et al[74] stated that 55.2% of the institutionalised population was wearing complete dentures and 29.3% was wearing removable partial dentures. In other countries such as India[75], where only 12% of the population had full dentures, and none of them had partial removable dentures, the need for some sort of prosthodontics is very high, where more than 40% of the population require full dentures and 23.3% require upper multiunit prosthesis and 27.1% lower multiunit prosthesis.

All these findings make us reach the conclusion that wearing some sort of removable dentures is very common amongst institutionalized elders. That is why De Visschere et al[68] stated in their guidelines the importance of a systematic oral health care for patients wearing any sort of removable dentures to prevent *Candida* infections and that the denture should be cleaned and removed when the residents go to sleep. These guidelines would improve the overall oral health of the patient; and in those wearing partial dentures increase the lifespan of the remaining natural dentition.

Occlusion is not usually assessed on these type of studies, unless they are specifically evaluating it. Mesas et al[60] stated that 27% of their sample did not have posterior occlusion. And Iglesias-Corchero[41] found that only 5% of the population had all their teeth, whereas 42% of their studied population was edentulous of one arch. Similarly, Schmitter et al[74] found that 15.5% had all their natural teeth or wore fixed prosthesis and 55.2% had complete dentures. On a recent review article on prevalence and incidence of tooth loss in Europe[55], they stated that the second confounding issue was that about 25% of dentate older people only have teeth in one jaw, similar to the 19.4 on our study, increasing the problems of stability of their opposing complete denture. These results support our findings where only 12.3% of the residents in our study had occlusal contacts on at least four functional areas.

Hildebrandt et al observed that decreased number of functional units were associated with patient avoiding to eat stringy (beef/steak), crunchy (carrots) and dry solid food (bread)[76], leading to conclude that the presence of 20 or more teeth in the mouth were associated to normal BMI values[77].

Taddei et al[78] performed autopsies to 54 TMJs divided into patients with teeth, edentulous without dentures and edentulous with complete dentures. The histological and morphometric study of these TMJs revealed that the use of complete dentures improved the masticatory efficiency and the aesthetics of the patient and has a favourable protective effect on the TMJ structure. That's why it is so important to provide prosthesis to those patients that become edentulous and to maintain them in good standards.

7.4 TMJ AND ORAL MUCOSA DISORDERS:

Few studies evaluate signs and symptoms on the TMJ, however those that studied it had very different results amongst them. Pinzón et al[6] found that 86% of their studied population didn't have any signs or symptoms, whereas 11% has clicks and 1% pain during movement. These results are similar to a German study done on a non-institutionalized population, where they also concluded that women tended to have more signs and symptoms on the TMJ than men[79]. On the other hand, Schmitter et al[74] did a study where they compared the TMJ between a young population (university staff with all the teeth and no dentures) with institutionalized German elders; in the older group 38% had joint sound on opening and 47.4% suffered from generalized joint disease. Both extra-oral and intraoral muscle palpation was painful on 12% of these patients while they didn't find any difference between complete denture wearers and other groups of geriatric population with respect to pain-free unassisted mouth opening. A similar study was done in Brazil[80]; they concluded that the incidence of craniomandibular disorder symptoms was low in this group of elderly wearers of full dentures, except for pain in the masseter (39%) and articular noises (24%). These results are quite similar to our study where 9.1% of the population had tenderness to palpation and 32.1% clicks on opening. On the other hand Al-Jabrah[81] et al concluded that partially edentulous patients (wearing removable partial dentures) exhibited more TMJ signs and tenderness to palpation when compared with the patients wearing complete dentures.

A recent study done in Nigeria[82] concluded that posterior occlusal wear was significantly associated with pain on palpation and TMJ sound, although this study was done in a younger population (18 to 65 years old), this pathology of the dentition is becoming increasingly more prevalent among the elderly. That is why we believe that it is something that needs to be evaluated in similar studies to ours to be able to evaluate any correlation with TMJ disorders.

In regards to oral mucosal disorders, Pinzón et al[6] found that 35% of their studied population had lesions on the oral mucosa, where haemangioma and ulcers were the most frequent disorders found. These results are very similar to

our findings where 32.2% of the patients had some lesions, and the main category was others where we included disorders such as haemangioma, geographic tongue, etc., followed by ulcers and Candida. Other articles that reported oral mucosa lesions studied this aspect on denture wearers and found that 56.1% of them had some sort of oral mucosa condition, being denture stomatitis the most prevalent condition (12.9%)[83]. Similarly Simon et al[65] found that 40% of denture wearers had clinically diagnosed denture stomatitis and 29% of all residents of the nursing home had angular cheilitis.

7.5 RELATION BETWEEN COGNITIVE IMPAIRMENT AND ORAL HEALTH:

Cognitive impairment jeopardizes oral health, systemic health and quality of life in adults. It refers to the loss of higher level of reasoning, memory loss, learning disabilities, attention deficits, decrease intelligence and other mental functions[84]. Individuals with mild cognitive impairment have been already associated with poor oral hygiene, higher scores of gingivitis and more root caries than those without impariment[85]. However the purpose of our study was to investigate if there was any relation between the loss of cognition and oral health. We found that there was a link between cognitive impairment and frequency of tooth brushing, Eichner Index and DMFT, however there was no correlation with GOHAI and CPI. These results are similar to those found by Velasco-Ortega[44], where they proved that there was an association between number of teeth (more missing teeth) and an increase for dental treatment amongst those patients with cognitive impairment. There is also an increase of coronal and root caries on older adults with cognitive impairment[86,87]. Usually the treatment provided to institutionalised psychiatric patients is extractions rather than restorations because the carious disease progresses over time as no preventive measures are undertaken[44,88]. Similarly Chen et al[84] found a correlation between severity of dental caries and number of retained roots with cognitive impairment. The number of patients that required extractions due to caries or periodontal disease reached 80.7% of those patients, and similarly to our study only 4% of them had good oral hygiene[88]. This could be related to patients not being able to perform oral hygiene, because, as Chen et al[84] stated, a considerable proportion of the patients with cognitive impairment and dementia needed supervision or help to maintain oral hygiene. Probably, this could lead to edentulism being associated with cognitive impairment, although this correlation was only found in the community residents and not in nursing-home patients[89].

Furthermore, studies done on community-dwelling patients, found a correlation with periodontal disease, where those patients with worse cognitive function were more likely to suffer periodontal disease[89,90]. Adam et al[91] also found that those patient with moderate to severe cognitive impairment had worse plaque

and calculus scores but there were no differences with DMFT index. They also concluded that those patients living in nursing homes with moderate to severe cognitive impairment might have had a negative effect on their oral health, but they concluded that further investigations in this field needed to be done because of disparities of results between articles and the fact that not all investigations used the same test to investigate the cognition of the individuals.

On the other hand, Chalmers et al[92] concluded that elderly patients living in the community with cognitive impairment were more likely to have denture-related soft tissue lesions.

As we have seen it is very important to monitor oral health amongst elderly patients because it has been stated that poor oral health may be a risk factor for cognitive decline. The reason being that periodontal diseases are common sources of chronic infection and are associated with raised tissue and serum levels of proinflammatory cytokines, which themselves have been implicated as possible risk factors for neurodegeneration[93].

7.6 EVALUATION OF THE SELF-PERCEPTION OF ORAL HEALTH:

Over the last few years there has been an increase in the number of studies trying to assess the impact of oral diseases in an older population by using different types of assessments. The most widely used test to evaluate the self-perception of oral health in a geriatric population has been GOHAI. Although this is an assessment tool and not an objective measure of the patient's oral health status. It gives good information about patient's oral complaints to assist in deciding when a dental referral is appropriate and from an epidemiological point of view it could be a cost-effective means of gaining information about people's oral health problems[31].

In our study 41.9% of patients had a bad self-perception of their oral health (58.3% of the patients, if we exclude those who couldn't answer the questionnaire correctly); similarly, Pinzón et al[34] stated that 68% of their patients had a GOHAI ≤57 and 98.5% of the cases had dental care needs; Kshetrimayum et al[54] found that 69.5% of the population they studied had low self-perception of their oral health. Other studies have calculated the mean result of the GOHAI and they ranged from 32.1% to 33.03%[60,94] (this last result was based on the Portuguese translation where the scores could range between 18 and 36).

Although we found a positive correlation between DMFT index, prosthetic needs and Eichner index with GOHAI but none between prosthetic status and GOHAI, Atieh et al[94] mentioned that those who were wearing a removable prosthesis had a significantly lower GOHAI score than those who did not, while Mesas et al[60] said that the compensation for the loss of teeth through the use of prosthesis had contributed towards a positive self-perception. Similar to these results, Pinzon et al[6] concluded that GOHAI was a good test to predict dental needs in 98.5% of the cases and more specifically in 80.8% of those requiring prosthesis. Atchinson[31] also mentioned that having fewer teeth, wearing removable dentures and perceiving the need for dental treatment were significantly related to worse GOHAI scores. These results are similar to those by Cornejo et al[95] who postulated that poor oral health related quality of life was associated to the need for dentures and functional edentulism. On the other hand

Rodrigues et al[96] indicated that edentulism did not affect quality of life, however Heinonen et al[97] postulated that tooth loss could affect the ability to relate with others and it could have an impact on the person's lifestyle as it could cause problems with communication with others, causing depression, sadness and isolation. These conclusions are similar to those by Kshetrimayum et al[54] were they found significant differences in total GOHAI score between dentate (49.02 ± 9.3) and edentulous groups (41.22 ± 5.8). In relation to the DMFT index, Sánchez-García et al[35] found that the missing and filled components of the DMFT index had a significant correlation with the GOHAI score although this correlation was found to be low.

Other studies checked the possible problems that a patient could have such as when eating or chewing, speaking, tasting, etc. For instance Simon et al[65] reported that 19% of the population studied had difficulties eating and 25% had problems with taste. The majority of problems were reported by people who had teeth and dentures rather than those with only teeth. Henriksen et al[61] said that 31.4% answered yes when asked about having problems while eating or chewing, and it was more prevalent in those individuals who wore dentures. On the other hand, Kshetrimayum et al[54] found that dentate subjects experienced more often problems when swallowing and speaking, had sensitivity on their teeth and felt more uncomfortable when eating in front of other than edentulous patients.

There is a controversy in regards to the correlation between gender and GOHAI because as it was mentioned in the article by Trentini et al[98], men demonstrated greater acceptance of the ageing process as well as the related health problems, while women showed greater flexibility and dynamism with regards to ageing, seeking possible remedies for daily health demands. That's why the results by Panizzi-Nunes et al[99] where they didn't find any relation between the two of them, are contradicted by those done by Mesas et al[60] who found that negative self-perception was associated with women and presence of depression. Cornejo et al[95] concluded that women had a higher prevalence of poor oral health related quality of life according to GOHAI than men, although these results were not statistically different.

Opposite to our findings, Sánchez-García et al[100] found that presence of cognitive decline was associated with higher mean GOHAI scores and they also found a statistically significant correlation between missing teeth and the filling component of the DMFT index, while no correlation was found between GOHAI and root caries.

It has been stated by Piuvezman et al[33] that an epidemiological survey needs to be complemented by self-perception data for institutionalised populations in order to determine oral health needs. As we have seen in this discussion, there are no clear correlations between self-perception of oral care and the objective conditions. A possible explanation has been that many dental diseases are asymptomatic and unknown to the individual[33]. Other authors such as Miura et al[101] also suggested that the assessment of quality of life using the GOHAI appeared to be a good indicator of functional impairment and psychosocial status related to oral health, because they found a significant correlation between Oral Health Related Quality of Life (OHRQoL) and risk for dysphagia and communication activities of daily living. They concluded that enhancement of feeding and verbal communication could improve the Quality of Life among frail elders. Similarly, Gil-Montoya[102] reported a correlation between GOHAI and nutrition status. They explained that a decline of oral function could lead to poor quality of diet among the community-dwelling elderly and as a result they could be at an increased risk of malnutrition. That's why they also suggested that the assessment of OHRQoL using the GOHAI should be considered to be important for the nutrition management of the elderly. These finding are similar to those reported by Rordigues et al[96] where they stated that OHRQoL was associated with nutritional deficit.

GOHAI has also been used to determine if offering dental treatment to the institutionalised elderly could improve their self-perception of oral health. Naito et al[103] demonstrated that there was an increase in GOHAI scores between baseline and 6 weeks after dental treatment in relation to the control group where they were not offered any treatment.

8. ANSWER TO THE HYPOTHESES OF THE STUDY:

We have shown the alternative hypotheses (H_1) are accepted both in the evaluation of the cognitive impairment and in the self-perception of oral health.

The oral health of the elderly (more than 65 years old) living in nursing homes deteriorates (higher DMFT index) as their cognitive impairment worsens.

We have also confirmed that higher DMFT indices are related to worse self-perception of oral health (GOHAI≤57).

9. CONCLUSION:

In relation to the aims and objectives stated at the beginning of this thesis we can conclude that:

1. No extra-oral abnormalities were found on 83% of the population.
2. Although very few people had symptoms on their TMJ, when assessing it, 32.1% of the population had clicks and 33.5% had reduced mobility of the jaw.
3. The majority of patients didn't have any alteration on the oral mucosa. Those who had they usually were age related alterations such as fissured tongue, or due to the fact that they were wearing dentures such as ulcers or candidiasis.
4. The main periodontal condition was calculus and without loss of attachment.
5. The DMFT index on this population was 26.42 being the missing component the most prevalent. 13.4% of the roots were exposed with nearly 6% of them being carious.
6. Extractions was the principal treatment needed followed by fillings.
7. In regards to prosthesis status, the majority of people were wearing removable dentures and it was this type of dentures the ones that were more needed as well.
8. Although 28% of the population brushed their teeth more than once a day, 14.3% of the patient never brushed their teeth.
    - We also found a correlation between periodontal disease and frequency of brushing teeth.
9. The majority of patients had bad self-perception of their own oral health.
    - We also found a correlation between GOHAI and Prosthetic needs as well as Eichner index.
10. There are still a high proportion of edentulous patients within nursing homes (33.5%). Only 3.63% of patient had all their teeth.
11. The majority of patient has severe cognitive impairment.

- There was a correlation between cognitive impairment and frequency of toothbrushing, DMFT index and Eichner index.

10. PROPOSALS AND FUTURE PROSPECTS:

The oral health of elderly people living in nursing homes in Catalonia has deteriorated and some of the indices remain the same than some surveys done in Spain more than twenty years ago. There are still a very high percentage of edentulous patients, and those with teeth have problems in keeping good oral hygiene, resulting in many patients needing basic periodontal treatment and fillings.

This fact means that by providing basic treatment such as prevention by means of using fluoride or chlorhexidine varnishes to control cariogenic dental plaque and promote remineralisation of previous lesions and periodical scale and polish to people living in nursing homes, their oral health could improve dramatically.

Promoting these measures would imply that dental professionals, both dentists and dental hygienists, would need to be more involved within the nursing homes.

As we aimed in the introduction of this thesis, we hope that these results will document and justify new political decisions in regards to preventive and health care programs for the elderly people.

11. BIBLIOGRAPHY:

1. Divisió d'atenció Sociosanitària. Àrea Sanitària. CatSalut. L'atenció sociosanitària a Catalunya. Vida als anys 2003. Servei Català de la Salut. Generalitat de Catalunya. Ed. CatSalut, 2004.
2. Puigdollers A, Jové Ll, Cuenca E. Encuesta epidemiológica de Salud Bucodental en la población geriátrica institucionalizada catalana. 1ª Parte: Higiene Oral y Condición Periodontal. Arch Odontoest. 1993; 9:687-96.
3. Puigdollers A, Jové Ll, Cuenca E. Encuesta epidemiológica de Salud Bucodental en la población geriátrica institucionalizada catalana. 2ª Parte: Caries dental y necesidades de tratamiento. Arch Odontoest (sup. Preven Comunit). 1995; 11:357-70.
4. Velasco E, Obando R, Bullón P. La valoración del estado dental en los adultos mayores. Arch Odontoest 1995;11(7) Supl.1:377-384.
5. Ortolá JC, Almerich JM, Sánchez M, Tatay V. Estado de la sauld bucodental en la población mayor de 65 años, institucionalizada, en la Comunidad Valenciana. Arch odontoest 1994;15(3):123-131.
6. Pinzón SA, Conti F, Conti R. La salud bucodental en población geriátrica institucionalizada en huéscar (Granada). Arch odontoest 1999;15(2):553-562.
7. Mallo-Pérez L, Rodríguez-Baciero G, Goiriena de Ganadarias FJ, Lafuente-Urdingio P. Estudio epidemiológico de la caries en los ancianos institucionalizados españoles. RCOE 2001;6(1):17-24.
8. Encuesta de salud bucodental. Métodos básicos (4ª edición). OMS 1997.
9. Gil M, Cuenca E, Bellet A, Salleras L. Resultats de l'enquesta preliminar de càries dentària en la població escolar del Priorat, la Ribera d'Ebre i la Terra Alta (2.ª part). Ann Med (Barc) 1984; 3: 76-80.
10. Manau C, Cuenca E, Canela J, Salleras L. Resultats preliminars de l'evaluació del Programa preventiu de cáries entre els escolars de Catalunya. Salut Catalunya 1989; 3: 27-28.
11. Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. World Population Prospects: The 2006

Revision, Highlights. New York: United Nations; 2007 [Working Paper No. ESA/P/WP.202].

12. IDESCAT (Institut d'estadística de Catalunya). Projeccions de población 2021-2041 (base 2008). Principals resultats. Barcelona: Generalitat de Catalunya; 2009 [http://idescat.cat/p/pp2021-2041pr].
13. Rosa Días Martínez (IMSERSO. Observatorio de Personas Mayores). Las personas mayores en España. Datos estadísticos estatales y por Comunidades Autónomas. Informe 2008/Tomo I. Ed. Ministerio de Sanidad y Política Social, 2009.
14. Generalitat de Catalunya. Departament de Salut. Enquesta de salut de Catalunya 2012. Ed. Servei del pla de Salut, 2013.
15. Lamster IB, Northridge ME. Improving Oral Health for the Elderly. An interdisciplinary approach. Chapter 13: Caries, tooth loss, and conventional tooth replacement for older patients. Ed. Springer 2008.
16. Ortolá Siscar JC, Almerich Silla JM, Tatay Vivó V, Eustaquio Raga MV. La caries radicular en el paciente mayor. RCOE 2001;6(1):37-46.
17. Banting DW. The diagnosis of root caries. NIH Consensus Conference on Diagnosis and Management of Dental Caries throughout Life, 2001.
18. Leake J. The management of root caries. NIH Consensus Conference onDiagnosis and Management of Dental Caries throughout Life, 2001.
19. Billings RJ. Restoration of carious lesions of the root. Gerodontology1986;5:43-9.
20. Jones JA. Root caries: prevention and chemotherapy. Am J Dent. 1995;8(6):352-7.
21. Van der Velden U. Effect of age on the periodontium. J Clin Periodontol 1984;11:281-294.
22. Nishimura F, Terranova VP, Braithwaite M et al. Comparison of human periodontal ligament cells in juvenile and aged donors. Oral Dis 1997;3:162-166.
23. Roholl PJM, Blauw E, Zurcher C, Dormans JAMA, Thenus HM. Evidence for a diminished maturation of preosteoblasts into osteoblasts during aging in rats: an ultrastructural analysis. J Bone Miner Res 1994;9:355-366.

24. Huttnew EA, Machado DC, Oliveiras RB, Antunes AGF, Hebling E. Effects of human aging on periodontal tissues. Spec Care Dentist 2009;29(4):149-155.
25. McKenna G, Burke FM. Age-related oral changes. Dental Update 2010;37:519-523.
26. Llodra-Calvo JC. Encuesta de salud oral en España 2010. RCOE 2012;17(1):13-41.
27. Käyser AF. Shortened dental arches and oral function. Journal of Oral Rehabilitation 1981;8:457-468.
28. Leake JL, Hawkins R, Locker D. Social and functional impact of reduced posterior functional units in older adults. Journal of Oral Rehabilitation 1994;21:1-10.
29. Narby B, Kronström M, Söderfeldt B, Palmqvist S. Prosthodontics and the patient: what is oral rehabilitation need? Conceptual analysis of need and demand for prosthetic treatment. Part 1: A conceptual analysis. International Journal of Prosthodontics 2005;18:75-79.
30. Slade DG, Spencer AJ. Development and evalutation of the oral health impact profile. Coomunity Dent Health 1994;11:3-11.
31. Atchison KA, Dolan TA. Development of the Geriatric Oral Health Assessment Index. Journal of Dental Education 1990;54(11):680-687.
32. Locker D, Allen F. Developing short-form measures of oral health-related quality of life. Journal of Public Health Dentistry 2002; 62(1):13-20.
33. Piuvezam G, Costa da Lima K. Self-perceived oral health status in institutionalized elderly in Brazil. Archives of Gerontology and Geriatrics 2012;55:5-11.
34. Pinzon-Pulido SA, Gil-Montoya JA. Validacion del indice de salud oral en (1):geriatria en una poblacion geriatric institucionalizada de Granada. Rev Esp Geriatr Gerontol 1999;34(5)273-282.
35. Sánchez-García S, Heredia-Ponce E, Juárez-Cedillo T, Gallegos-Carrillo K, Espinel-Bermúdez C, et al. Psychometric properties of the General Oral Health Assessment Index (GOHAI) and dental status of an elderly Mexican population. Journal of Public Health Density 2010;70:300-307.
36. Llodra-Calvo JC, Bourgeois D. Estudio Prospectivo Dephi. La salud Bucodental en España 2020. Tendencias y objetivos de salud oral.

Fundación dental Española, Consejo Dentistas 2009 (http://www.consejodentistas.es/pdf/DELPHI/Untitled1.html)

37. Linstone H, Turoff M. The Delphi method. Techniques and applications. Addison-Wesley, 1975, p.3.
38. Hobdell M, Petersen PE, Clarkson J, Johnson N. Global goals for oral health 2020. Int Dent J 2005;53:285-288.
39. Eichner K. ber eine gruppeneinteilung der lückengebisse für die prothetik. Deustche Zahnärztliche Zeitschrift. 1955;10:1831-4.
40. Pfeiffer E. A short portable mental status questionnaire for the assessment oforganic brain deficit in elderly patients. J Am Geriatr Soc 1975 Oct;23(10):433-41.
41. Iglesias-Corchero AM, García-Cepeda JR. Oral health in people over 64 years of age, institutionalized in centres for the Aged in the Vigo Health District Spain 2005. Med Oral Patol Oral Cir Bucal 2008;13(8):E523-8.
42. Cortés FJ, Ardanaz E, Moreno C. la salud oral de los adultos de 65-74 años de Navarra. Arch Odontoest Preventiva-Comunitaria 1992;4(2):51-60.
43. Velasco E, Bullón P, Martínez J, Villasana A, Lacalle J. Salud oral en una población geropsiquiátrica institucionalizada. Arch odontoest. Preventiva-Comunitaria 1994;10(Supl.II):633-640.
44. Velasco-Ortega E, Segura-Egea JJ, Córdoba-Arenas S, Jiménez-Guerra A, Monsalve-Guil L, López-López J. A comparison of the dental status and treatment needs of older adults with and without chronic mental illness in Sevilla, Spain. Med Oral Patol Oral Cir Bucal 2013;18 (1):e71-5.
45. Simons D, Kidd E A M, Beighton D. oral Health of elderly occupants in residential homes. The Lancet 1999; 353 (9166):1761.
46. Eustaquio-Raga MV, Montiel-Company JM, Almerich-Silla JM. Factors associated with edentulousness in an elderly population in Valencia (Spain). Gac Sanit 2013;27(2):123-127.
47. Spanish Geriatric Oral Health Research Group. Oral health issues of Spanish adults aged 65 and over. The Spanish Geriatric Oral Health Research Group. Int Dent J. 2001;51(3 Suppl):228-34.
48. Lopez-Jornet P, Saura-Perez M, Llevat-Espinosa N. Effect of oral health dental state and risk of malnutrition in elderly people. Geriatr Gerontol Int 2013;13:43-49.

49. Ritchie CS, Joshipura K, Silliman R, Miller B, Douglas CW. Oral health problems and significant weight loss among community-dwelling older adults. The Journals of Gerontology 2000;55A(7):M266-M371.
50. Medina-Solis CE, Perez-Nunez R, Maupome G, Avila-Burgos L, Pontigo-Loyola AP, et al. National survey on edentulism and its geographic distribution, among Mexicans 18 years and older (with emphasis in WHO age groups). Journal of oral rehabilitation 2008;35:237-244.
51. Dye BA, Fisher MA, Yellowitz JA, Fryar CD, Vargas CM. Receipt of dental care, dental status and workforce in U.S. nursing homes: 1997 National Nursing Home Survey. Spec Care Dentist 2007;27(5):177-187.
52. Bush HM, Dickens NE, Henry RG, Durham L, Sallee N, et al. Oral Health Status of older adults living in Kentucky: results from the Kentucky Elder Oral health Survey. Spec Care Dentist 2010;30(5):185-192.
53. Philip P, Rogers C, Kruger E, Tennant M. Caries experience of institutionalized elderly and its association with dementia and functional status. Int J Dent Hygiene 2012;10:122-127.
54. Kshetrimayum N, Reddy CVK, Siddhana S, Manjunath M, Rudraswamy S, Sulavai S. Oral health-related quality of life and nutritional status of institutionalized elderly population aged 60 years and above in Mysore City, India. Gerodontology 2013;30;119-125.
55. Müller F, Naharro M, Carloson GE. What are the prevalence and incidence of tooth loss in the adult and elderly population in Europe? Clin Oral Impl Res 2007;18(Suppl. 3):2-14.
56. Treasure E, Kelly M, Nuttal N, et al. Factors associated with oral health: a multivariate analysis of results from the 1998 Adult Dental Health Survey. Br Dent J 2001;190:60-8.
57. Cunha-Cruz J, Hujoel PP, Nadanovsky P. Secular trends in socio-economic disparities in edentulism: USA, 1997-2001. J Dent Res 2007;86:131-136.
58. Joshipura KJ, Willet WC, Douglass CW. The impact of edentulousness on food and nutrient intake. J Am Dent Assoc 1996;127:459-467.
59. Kayak HA, Grayston MN, Crinean CL. Oral health problems and needs of nursing home residents. Community Dent Oral Epidemiol 1993;21:49-52.

60. Mesas AE, Maffei de Andrade S, Sarria-Cabrera MA. Factors associated - with negative self-perception of oral health among people in a Brazilian community. Gerodontology 2008;25:49-56.
61. Henriksen BM, Ambjornsen E, Laake K, Axell TE. Oral hygiene and oral symptoms among the elderly in long-term care. Spec Care Dentist 2004;24(5):254-259.
62. Subirà Pifarré C, Ramón Torrel JM, Grupo Español de Investigación en Gerodontología. La salud bucodental de los españoles mayores de 64 años. Impacto en el estado de salud individual. RCOE 2000;5(6):613-620.
63. Ettinger R. Restoring the ageing dentition: repair or replacement. Int Dent J. 1990 Oct;40(5):275-82.
64. Wu B, Plassman BL, Liang J, Wei L. Cognitive function and dental care utilization among community-dwelling older adults. American Journal of Public Health 2007; 97(12): 2216-2221.
65. Simons D, Brailsford S, Kid EAM, Beighton D. Relationship between oral hygiene practices and oral status in dentate elderly people living in residential homes. Community Dent Oral Epidemiol 2001;29:464-470.
66. Morishita M, Takaesu Y, Miyatake K, Shinsho F, Fujioka M. Oral health care status of homebound elderly in Japan. Journal or oral Rehabilitation 2001:28:717-720.
67. Akar GC, Ergul S. The oral hygiene and denture status among residential home residents. Clin Oral Invest 2008;12:61-65.
68. Kalk W, Baat C, Meeuwissen J. Is there a need for gerodontology? Int Dent J. 1992;42:209-216.
69. Forsell M, Sjögren P, Kullberg E, Johansson O, Wedel P, Herbst B, et al. Attitudes and perceptions towards oral hygiene tasks among geriatric nursing home staff. Int J Dent Hyg 2011;9:199-203.
70. Coleman P, Watson NM. Oral care provided by certified nursing assistants in nursing homes. J Am Geriatr Soc 2006;54:138-43.
71. Cornejo-Ovalle M, Costa-de-Lima K, Pérez G, Borrel C, Casals-Peidro E. Oral health care activities performed by caregivers for institutionalized elderly in Barcelona-Spain. Med Oral Patol Oral Cir Bucal 2013;18(4):e641-649.

72. Zenthöfer A, Dieke R, Dieke A, Wege KC, Rammelsberg P, Hassel AJ. Improving oral hygiene in the long-term care of the elderly-a RCT. Community Dent Oral Epidemiol 2013;41:261-268.
73. De Visschere LMC, Van der Putten GJ, Vanobbergen JNO, Schols JMGA, De Baat C. An oral health care guideline for institutionalised older people. Gerodontology 2011;28:307-310.
74. Schmitter M, Rammelsberg P, Hassel A. The prevalence of signs and symptoms of temporomandibular disorders in very old subjects. Journal or Oral Rehabilitation 2005;32:467-473.
75. Shenoy RP, Hedge V. Dental prosthetic status and prosthetic need of the institutionalized elderly living in geriatric homes in Mangalore: a pilot study. ISRN Dentistry 2011; Article ID 987126, 3 pages. doi:10.5402/2011/987126.
76. Hilderbrandt GH, Dominguez BL, Schork MA, Loesche WJ. Functional units, chewing, swallowing and food avoidance among elderly. J Prosthet Dent 1997;77:588-595.
77. Marcenes W, Steele JG, Sheiham A, Walls AW. The relationship between dental status, food selection, nutrient intake, nutritional status, and body mass index in older people. Cad Saude Publica 2003;19:809-816.
78. Taddei C, Frank RM, Cahen PM. Effects of complete denture wearing on temporomandibular joints: a histomorphometric study. J Prosthet Dent 1991;65(5):692-8.
79. Gesch D, Bernhardt O, Alte D, Schwahn C, kocher T, et al. Prevalence of signs and symptoms of temporomandibular disorders in an urban and rural German population: results of a population-based study of health in Pomerania. Quintessence International 2004;35(2):143-150.
80. Santos JF, Marchini L, Campos MS, Damião CF, Cunha VP, Barbosa CM. Symptoms of craniomandibular disorders in elderly Brazilian wearers of complete dentures. Gerodontology. 2004 Mar;21(1):51-2.
81. Al-Jabrah OA, Al-Shumailan YR.Prevalence of temporomandibular disorder signs in patients with complete versus partial dentures. Clin Oral Investig. 2006 Sep;10(3):167-73. Epub 2006 Apr 25.

82. Oginni AO, Oginni FO, Adekoya-Sofowora CA. Signs and symptoms of temporomandibular disorders in Nigerian adult patients with and without occlusal tooth wear. Community Dent Health. 2007 Sep;24(3):156-60.
83. Dundar N, Kal B I. oral mucosal conditions and risk factors among elderly in a Turkish School of dentistry. Gerontology 2007;53:165-172.
84. Chen X, Clark JJ, Chen H, Naorungroj S. Cognitive impairment, oral self-care function and dental cries severity in community-dwelling older adults. Gerodontology2013; doi:10.1111/ger.i2061
85. Wu B, Plassman B, Crout R, Caplan D, Bonne M, Wiener M et al. Oral health disparities among elders with and without cognitive impairment. J Dent Res 2010;89 (Special Issue A): paper 129572.
86. Wu B, Plassman BL, Crout RJ, Liang J. Cognitive function and oral health among community-dwelling older adults. Journal of Gerontology 2008;63A(5):495-500.
87. Ellefsen B, Holm-Pedersen P, Morse DE, Schroll M, Andersen BB, Waldemar G. Caries prevalence in older persons with and without dementia. J Am Geriatr Soc 2008;56;59-67.
88. Angelillo IF, Nobile CG, Pavia M, De Fazio P, Puca M, Amati A. Dental health and treatment needs in institutionalized psychiatric patients in Italy. Community Dent Oral Epidemiol 1995;23:360-4.
89. Stewart R, SabbahW, Tsakos G, D'Aiuto F, Watt RG. Oral health and cognitive function in the third national health and nutrition examination survey (NHANES III). Psychosomatic Medicine 2008;70:936-941.
90. Yu YH, Kuo HK. Association between cognitive function and periodontal disease in older adults. JAGS 2008;56(9):1693-1697.
91. Adam H, Preston AJ. The oral health of individuals with dementia in nursing homes. Gerodontology 2006;23:99-105.
92. Chalmers JM, Carter KD, Sèncer AJ. Oral diseases and conditions in community-living older adults with and without dementia.Spec Care Dentist 2003;23:7-17.
93. Engelhart MJ, Geerling MJ, Meijer J, Kiliaan A, Ruitenberg A, et al. Inflammatory proteins in plasma and the risk for dementia. Arch Neurol 2004;61:668-72.

94. Atieh MA. Arabic version of the geriatric oral health assessment index. Gerodontology 2008;25:34-41.
95. Cornejo M, Pérez G, Lima KC, Casals-Peidró E, Borrel C. Oral Health-Related Quality of Life in institutionalized elderly in Barcelona (Spain). Med Oral Patol Oral Cir Bucal 2013;18(2):e285-92.
96. Rodrigues SM, Oliveira AC, Duarte-Vargas AM, Nogueira-Moreira A, Ferreira e Ferreira E. Implications of edentulism on quality of life among elderly. Int H Environ Res Public Health 2012;9:100-109.
97. Heinonen H, Aro AR, Aalto AM, Uutele A. Is the evaluation of the global quality of life determined by emotional status? Qual Life Res 2004;13:1347-1356.
98. Trentini CM, Chachamouich E, Costa M, Muller M, Fleck M. Impact variables associated with quality of life in old adults research. Qual Life Res 2003;12:1763-1770.
99. Panizzi-Nunes LI, Abegg C. Factors associated with oral health perception in older Brazilians. Gerodontology 2008;25:42-48.
100. Sánchez-García S, Heredia-Ponce E, Juarez-Cedillo T, Gallegos-Carrillo K, Espinel-Bermúdez C, et al. Psychometric properties of the General Oral Health Assessment Index (GOHAI) and dental status of an elderly Mexican population. Journal of Public Health Dentistry 2010;70:300-307.
101. Miura H, Yamasaki K, Moriya S, Sumi Y. Factors influencing oral health-related quality of life (OHRQoL) among the frail elderly residing in the community with their family. Archives of Gerontology and Geriatrics 2010;51:e62-e65.
102. Gil-Montoya JA, Subirà C, Ramon JM, González-Moles MA. Oral health related quality of life and nutritional status. Am Assoc Public Health Dent 2008;68:88-93.
103. Naito M, Kato T, Fuji W, Ozeki M, Yokoyama M, Hamajima N, Saitoh E. Effects of dental treatment on the quality of life and activities of daily living in institutionalized elderly in Japan. Archives of Gerontology and Geriatrics 2010;50:65-68.

ANNEX 1: DATA COLLECTION DOCUMENT

INFORMACIÓN GENERAL:

Nombre: _____ Fecha Nacimiento: _____
Sexo: M□ F□ Grupo étnico: _____ Edad (años): _____
Población: _____ Tipo emplazamiento: 1□ 2□ 3□
(1:urbano; 2:periurbano; 3:rural)

EVALUACIÓN CLÍNICA:

Examen extraoral:
0: Aspecto normal
1: Úlceras, inflamaciones, erosiones, fisuras
(Cabeza, cuello, extremidades)
2: Úlceras, inflamaciones, erosiones, fisuras
(Nariz, mejillas, barbilla)
3: Úlceras, inflamaciones, erosiones, fisuras
(Comisuras)
4: Úlceras, llagas, inflamaciones, erosiones, fisuras
(Borde bermellón)
5: Cáncer oral (leucoplasia o similar que haga pensar en un posible cáncer)
6: Anomalías de los labios superior o inferior
7: Ganglios linfáticos abultados (cabeza, cuello)
8: Otras hinchazones de la cara y la mandíbula
9: No registrado

Evaluación de la ATM: (0: No; 1: Si; 9: No registrado)
Síntomas:

Signos: Chasquido
Dolor a la palapación
Movilidad reducida de la mandíbula (<30mm abertura)

MUCOSA ORAL:

Trastorno:
0: Ningún estado anormal
1: Lesión sospechosa de malignidad
2: Leucoplasia
3: Liquen plano
4: Úlceras (aftosas, herpéticas, traumática)
5: Gingivitis necrotizante aguda
6: Candidiasis
7: Abceso
8: Otro trastorno: _____
9: No registrado

Localización:
0: Borde bermellón
1: Comisuras
2: Labios
3: Surcos
4: Mucosa bucal
5: Suelo de la boca
6: Lengua
7: Paladar duro y/o blando
8: Bordes alveolares/encías
9: No registrado

ÍNDICE PERIODÓNTICO COMUNITARIO (IPC):

0: Sano
1: Hemorragia
2: Cálculo
3: Bolsa de 4-5mm
4: Bolsa de 6mm o más
X: Sextante excluido
9: No registrado

17/16 11 26/27

47/46 31 36/37

PÉRDIDA DE FIJACIÓN:

0: 0-3 mm
1: 4-5 mm (unión cemento-esmalte (UCE) dentro de banda negra)
2: 6-8 mm (UCE entre límite superior de banda negra y anillo de 8'5mm)
3: 9-11 mm (UCE entre anillos de 8'5 y 11'5 mm)
4: 12 mm o más (UCE más allá del anillo de 11'5 mm)
X: sextante excluido
9: No registrado

17/16 11 26/27

47/46 31 36/37

ESTADO DE LA DENTICIÓN Y TRATAMIENTO NECESARIO:

	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
Corona																
Raíz																
Tratamiento																

	48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
Corona																
Raíz																
Tratamiento																

Corona	Raíz	Situación
0	0	Satisfactoria
1	1	Cariado
2	2	Obturado con caries
3	3	Obturado sin caries
4	-	Perdido por resultado de caries
5	-	Perdido por cualquier otro motivo
6	-	Fisura obturada
7	7	Soporte puente/corona-implante
8	8	Diente No erupcionado o raíz cubierta
T	-	Traumatismo (fractura)
9	9	No registrado

Tratamiento
0: Ninguno
P: Preventivo, cuidados dentición de la caries
F: Obturación de fisura
1: 1 obturación superficial
2: 2 o + obturaciones superficiales
3: Corona
4: Revestimiento o lámina
5: Endodoncia + Reconstrucción
6: Extracción
7: Otra asistencia: _____
8: Otra asistencia: _____
9: No registrado

SITUACIÓN DE PRÓTESIS

Sup Inf

0: Ninguna Prótesis
1: Puente
2: Más de un puente
3: Dentadura postiza parcial
4: 2 puentes y dentadura postiza parcial
5: Dentadura completa removible
9: No registrado

NECESIDAD DE PRÓTESIS

Sup Inf

0: Ninguna prótesis necesaria
1: Necesidad de prótesis unitaria
2: N. de prótesis multiunitaria
3: N.de combinación prótesis unitaria + multiunitaria
4: N. 1 P.C. (sustitución todos dientes)
9: No registrado

FRECUENCIA DE CEPILLADO DE LOS DIENTES:

1: Más de una vez al día
2: Una vez al día
3: Al menos una vez a la semana
4: Menos de una vez a la semana
5: Nunca
6. No sabe, no contesta

CUESTIONARIO GOHAI validado para población geriátrica española institucionalizada

Pregunta: En los tres últimos meses…

		S	F	AV	RV	N
1	¿Cuántas veces ha tenido que comer menos o cambiar de comida por culpa de sus dientes o de su dentadura?	1	2	3	4	5
2	¿Cuántas veces ha tenido problemas al masticar comidas como la carne o las manzanas?	1	2	3	4	5
3	¿Cuántas veces ha tragado usted bien?	1	2	3	4	5
4	¿Cuántas veces no ha podido usted hablar bien por culpa de sus dientes o dentadura?	1	2	3	4	5
5	¿Cuántas veces no ha podido comer las cosas que usted quería sin tener ninguna molestia?	1	2	3	4	5
6	¿Cuántas veces no ha querido salir a la calle o hablar con la gente por culpa de sus dientes o dentadura?	1	2	3	4	5
7	¿Cuándo usted se mira al espejo, cuántas veces ha estado contento de cómo se ven sus dientes o su dentadura?	1	2	3	4	5
8	¿Cuántas veces ha tenido que utilizar algún medicamento para aliviar el dolor de sus dientes o las molestias en su boca?	1	2	3	4	5
9	¿Cuántas veces ha estado preocupado o se ha dado cuenta de que sus dientes o su dentadura no están bien?	1	2	3	4	5
10	¿Cuántas veces se ha puesto nervioso por los problemas de sus dientes o de su dentadura?	1	2	3	4	5
11	¿Cuántas veces no ha comido a gusto delante de otras personas por culpa de sus dientes o dentadura?	1	2	3	4	5
12	¿Cuántas veces ha tenido molestias o dolor en sus dientes por el frío, el calor o las cosas dulces?	1	2	3	4	5

S= siempre (1); F= frecuentemente (2); AV= algunas veces (3); RV= rara vez (4); N= nunca (5)
Los ítems 3 y 7 tienen una valoración inversa al resto de los ítems (siempre=5; frecuentemente=4; algunas veces=3; rara vez=2; nunca=1), conversión que se realiza al momento del análisis.

ÍNDICE DE EICHNER:

_____

_____

OBSERVACIONES:

_____

_____

ANNEX 2: INFORMATION TO THE PATIENT

Universitat Internacional de Catalunya

CUO Clínica Universitària d'Odontologia
Universitat Internacional de Catalunya

Comitè Ètic d'Investigació Clínica

6.- DOCUMENTO DE INFORMACIÓN AL PACIENTE PARTICIPANTE DEL ESTUDIO DE INVESTIGACIÓN

Número del protocolo de investigación: A-07JCT09

Versión del protocolo: 1.2

Fecha de la Versión del protocolo: 03-06-09

Título del estudio:"DETERMINACIÓN DE LA SALUD BUCODENTAL EN PERSONAS MAYORES INSTITUCIONALIZADAS RESIDENTES EN CATALUÑA".

Investigador principal: Dr. Manuel Ribera Uribe

Investigador secundario: Rosa Moreno López

Dirección: C/ Josep Trueta, s/n, 08191 Sant Cugat del Vallés

Teléfono: 93 504 20 00

Se ha solicitado su participación en un estudio de investigación. Antes de decidir si desea participar, es importante que comprenda los motivos por los que se lleva a cabo la investigación, cómo se va a utilizar su información, en qué consistirá el estudio y los posibles beneficios, riesgos y molestias que conlleva. Tómese su tiempo para leer detenidamente la siguiente información. Si ya participa en algún otro estudio, no podrá hacerlo en esta nueva investigación. Usted se podrá llevar una copia de esta hoja de información.

¿CUÁLES SON LOS ANTECEDENTES Y EL OBJETIVO DEL ESTUDIO?

El objetivo es determinar cual es la situación actual de la salud bucodental de las personas mayores de 65 años en Cataluña y así poder actualizar los datos disponibles que se remontan al año 1991.

¿TENGO OBLIGACIÓN DE PARTICIPAR?

La decisión sobre participar o no en el estudio le corresponde a usted. Incluso aunque decida no formar parte del estudio clínico, esto no supondrá ningún perjuicio para usted, incluido el tratamiento y asistencia que tiene derecho a recibir. Si decide participar, se le entregará este Formulario de Consentimiento Informado para que lo firme. Aunque decida tomar parte en la investigación, será

libre de abandonarla en cualquier momento que desee. La calidad de la asistencia que reciba no se verá afectada. Asimismo, el doctor encargado de dirigir el estudio “determinación de la salud bucodental en personas mayores de 65 años institucionalizados residentes en Cataluña” podría decidir que su participación ya no reporta ningún tipo de beneficio para usted y se optaría por retirarle del mismo. Su participación se dará por concluida sin su consentimiento si se le considera no apto para continuar en el estudio, en caso de que no siga las instrucciones del Doctor del estudio, si sufre algún tipo de daño relacionado con la investigación o por cualquier otro motivo justificado. Una vez haya concluido su participación, deberá someterse a los procedimientos de abandono de la investigación que el Doctor del estudio considere necesarios para garantizar su seguridad.

¿QUÉ PASARÁ SI ACEPTO PARTICIPAR?

Ha decidido colaborar voluntariamente en un proyecto de investigación epidemiológica sobre el estado oral de la población de las Residencias.

A partir de ahora la odontóloga investigadora procederá a efectuarle unas preguntas en relación a su historial médico y dental y le realizará una exploración de la boca.

Se le va a pasar un test (test de Pfeiffer) para su valoración cognitiva (rendimiento intelectual). Estos resultados serán totalmente confidenciales y serán de uso interno exclusivo para el estudio.

¿CÚALES SON MIS OBLIGACIONES?

Sus obligaciones serán dejarse explorar por la investigadora y responder a unas preguntas que le formulará.

¿CUÁLES SON LOS POSIBLES EFECTOS SECUNDARIOS, RIESGOS Y MOLESTIAS ASOCIADOS A LA PARTICIPACIÓN?

Dado que el estudio consiste en una encuesta y una exploración oral no existen efectos secundarios ni riesgos asociados.

¿CUÁLES SON LOS POSIBLES BENEFICIOS DE PARTICIPAR?

Usted va a seguir un procedimiento de inspección de su cavidad oral y será informado en todo momento de todo lo que diagnostique la investigadora lo cual le permitirá, con el asesoramiento facilitado, tomar las decisiones de tratamiento que crea oportunas.

¿CÓMO SE VAN A UTILIZAR MIS DATOS DEL ESTUDIO?

Según el Art. 3.6 del RD 223/2004 de 6 de Febrero, por el que se regulan los ensayos clínicos con medicamentos, el tratamiento, comunicación y cesión de los datos de carácter personal de los sujetos participantes en el ensayo, se ajustará a lo dispuesto en la Ley Orgánica 15/1999 de 13 de Diciembre de Protección de Datos de carácter personal.

Mediante la firma de este formulario, usted da su consentimiento al Doctor del estudio y a su personal para recopilar sus datos personales.

El Doctor del estudio utilizará sus datos personales para la administración y dirección del estudio, la investigación y los análisis estadísticos.

¿CÓMO PUEDO ESTABLECER CONTACTO SI NECESITO OBTENER MÁS INFORMACIÓN O AYUDA?

En caso de sufrir un daño relacionado con el estudio o para obtener respuesta a cualquier pregunta relativa al estudio o a los procedimientos/tratamiento del estudio, póngase en contacto con:

Dra. Rosario Cedeño

Coordinadora Investigación Clínica

Universitat Internacional de Catalunya

Dirección C/ Josep Trueta, s/n, 08195, Sant Cugat del Vallés

N.º de teléfono: 93 504 20 00

ANNEX 3: CONSENT FORM

Universitat Internacional de Catalunya

CUO Clínica Universitària d'Odontologia
Universitat Internacional de Catalunya

Comitè Ètic d'Investigació Clínica

7.- CONSENTIMIENTO INFORMADO

Núm.del estudio: A-07JCT09
Versión del protocolo: 1.2
Fecha de la versión: 03-06-09
Título: "Determinación de la salud bucodental en personas mayores institucionalizadas residentes en Cataluña"

"DETERMINACIÓN DE LA SALUD BUCODENTAL EN PERSONAS MAYORES INSTITUCIONALIZADAS RESIDENTES EN CATALUÑA"

Yo, Sr/a:……..

- He recibido información verbal acerca del estudio anterior y he leído la información escrita que se adjunta, de la cual he recibido una copia.
- He comprendido lo que se me ha explicado.
- He podido comentar el estudio y realizar preguntas al profesional responsable.
- Doy mi consentimiento para tomar parte en el estudio y asumo que mi participación es totalmente voluntaria.
- Entiendo que podré retirarme en cualquier momento sin que ello afecte a mi futura asistencia médica.
- Acepto responder a las preguntas de un test que tiene como objetivo hacer una valoración cognitiva (test de Pfeiffer) cuyos resultados serán totalmente confidenciales y de uso interno exclusivo para el estudio.

Mediante la firma de este formulario de consentimiento informado, doy mi consentimiento para que mis datos personales se puedan utilizar como se ha descrito en este formulario de consentimiento que se ajustan a lo dispuesto en la Ley Orgánica 15/1999 de 13 de Diciembre de Protección de Datos de carácter personal.

Entiendo que recibiré una copia de este formulario de consentimiento informado.

_____ _____

Firma del paciente.
Nº de DNI.

Fecha de la firma.

DECLARACIÓN DEL INVESTIGADOR

El paciente que firma esta hoja de consentimiento ha recibo, por parte del profesional, información detallada de manera oral y escrita del proceso y naturaleza de este estudio de investigación, y ha tenido la oportunidad de preguntar cualquier duda en cuanto a la naturaleza, riesgos y ventajas de su participación en este estudio.

_____ _____

Firma investigador Fecha de la firma

Nombre: Dr. Manuel Ribera Uribe

ANNEX 4: CONSENT FORM FOR THE TUTOR

Universitat Internacional de Catalunya

CUO Clínica Universitària d'Odontologia
Universitat Internacional de Catalunya

Comitè Ètic d'Investigació Clínica

7.- CONSENTIMIENTO INFORMADO TUTOR

Núm.del estudio: A-07JCT09

Versión del protocolo: 1.2

Fecha de la versión: 03-06-09

Título: "Determinación de la salud bucodental en personas mayores institucionalizadas residentes en Cataluña"

CONSENTIMIENTO INFORMADO

"DETERMINACIÓN DE LA SALUD BUCODENTAL EN PERSONAS MAYORES INSTITUCIONALIZADAS RESIDENTES EN CATALUÑA"

Yo, Sr/a:……

-He recibido información verbal acerca del estudio anterior y he leído la información escrita que se adjunta.

-He comprendido lo que se me ha explicado.

-He podido comentar el estudio y realizar preguntas al profesional correspondiente.

-Doy mi consentimiento para que mi tutelado tome parte en el estudio y asumo que él/ella participe de manera totalmente voluntaria.

-Entiendo que podré retirar a mi tutelado en cualquier momento sin que ello afecte a su futura asistencia médica.

-Acepto responder a las preguntas de un test que tiene como objetivo hacer una valoración cognitiva (test de Pfeiffer) cuyos resultados serán totalmente confidenciales y de uso interno exclusivo para el estudio.

Mediante la firma de este formulario de consentimiento informado, doy mi consentimiento para que los datos personales de mi hijo/tutelado se puedan utilizar como se ha descrito en este formulario de consentimiento que se ajustan a lo dispuesto en la Ley Orgánica 15/1999 de 13 de Diciembre de Protección de Datos de carácter personal.

Entiendo que recibiré una copia de este formulario de consentimiento informado.

Firma del tutor. Fecha de la firma.

Nº de DNI.

DECLARACIÓN DEL INVESTIGADOR

El tutor del paciente que firma esta hoja de consentimiento, ha recibido, por parte del profesional, información detallada de manera oral y escrita del proceso y naturaleza de este estudio de investigación, y ha tenido la oportunidad de preguntar cualquier duda en cuanto a la naturaleza, riesgos y ventajas de su participación en este estudio.

Firma Investigador Fecha de la firma
Nombre: Dr. Manuel Ribera Uribe

ASENTIMIENTO DEL PACIENTE:

Yo,……..,

-Bajo el consentimiento de mi tutor.

-Informado de forma verbal y escrita del estudio que se me va a realizar.

-Habiendo comprendido lo que se me ha explicado.

-Habiendo comentado el estudio y realizado preguntas al profesional responsable.

Doy mi asentimiento para tomar parte en el estudio y si mi tutor lo decide, podré retirarme en cualquier momento sin que ellos afecten a mi futura asistencia médica.

Entiendo que recibiré una copia de este formulario de asentimiento.

Firma del paciente Firma tutor Fecha de la firma
Nº de DNI

ANNEX 5: CONSENT FORM FOR NURSING HOMES (DIRECTOR)

Universitat Internacional de Catalunya

CUO Clínica Universitària d'Odontologia
Universitat Internacional de Catalunya

Comitè Ètic d'Investigació Clínica

COMPROMÍS DE VINCULACIÓ INSTITUCIONAL AL COMITÉ ÈTIC D'INVESTIGACIÓ CLÍNICA (CEIC) DE LA UNIVERSITAT INTERNACIONAL DE CATALUNYA (UIC) PER A LA TUTELA D'UN PROJECTE DE RECERCA CLÍNICA: "DETERMINACIÓN DE LA SALUD BUCODENTAL EN PERSONAS MAYORES INSTITUCIONALIZADAS RESIDENTES EN CATALUNYA"

___ (nom de la persona representant del Centre)_____, en qualitat de _____(càrrec de la persona respresentant)___ i en representació de _____(Nom del Centre)_____, declaro:

- Que _____(Nom del Centre)_____ accepta el compromís de ser tutelada el Comité d'Ètica d'Investigació Clínica CEIC-CUO (Clínica Odontològica Universitària) per aquells estudis, que s'efectuaran en les instal·lacions i amb pacients d'aquest Centre.
- Que accepta complir i fer complir els dictàmens i resolucions que emeti el CEIC Comité d'Ètica d'Investigació Clínica CEIC-CUO (Clínica Odontològica Universitària).
- Que accepta complir i fer complir les normes de funcionament que estableixi el CEIC Comité d'Ètica d'Investigació Clínica CEIC-CUO (Clínica Odontològica Universitària).
- Que els protocols i altres documents que regeixen la realització pràctica dels estudis, seran els mateixos que hauran estat prèviament presentats a aquest CEIC.

I per tal que així consti i tingui els efectes que corresponguin, signo aquest document.

Lloc i data

ANNEX 6: STUDY APPROVAL LETTER FROM CEIC

CEIC Comitè Ètic d'Investigació Clínica

Clínica Universitària d'Odontologia
Universitat Internacional de Catalunya

CARTA APROVACIÓ ESTUDI PEL CEIC

Número de l'estudi:A-07JCT09
Versió del protocol:1.2
Data de la versió:03-06-09
Títol:"Determinación de la salud bucodental en personas mayores institucionalizadas residentes en Cataluña"

Sant Cugat del Vallès, 23 de juny de 2009

Dr. Manuel Ribera

Referència: "Determinación de la salud bucodental en personas mayores institucionalizadas residentes en Cataluña"

Benvolgut Doctor,

Els membres del CEIC de la Clínica Universitària d'Odontologia, li agraeixen l'aportació científica en el camp de la investigació i la presentació del Protocol en aquest Comité per a la seva avaluació.

Valorades les noves aportacions realitzades a l'estudi, sol.licitades pel nostre CEIC, el passat dia 15 de juny de 2009, li comuniquem que el dictamen final ha sigut FAVORABLE.

Quedem a la seva disposició per a qualsevol dubte o aclaració al respecte.

Atentament,

Dr.Albert Balaguer
President CEIC

CUO Clínica Universitària d'Odontologia
Universitat Internacional de Catalunya

ANNEX 7: SUMMARY OF THESIS IN SPANISH

INTRODUCCIÓN:

El envejecimiento de la población es una de las transformaciones demográficas más importantes en nuestra sociedad. La creciente proporción de personas mayores de 65 años en la sociedad supone un desafío de consecuencias extraordinarias puesto que satisfacer sus demandas sociales, sanitarias, económicas y culturales implica un gran sobrecoste especialmente importante en los países industrializados.

Estos cambios ocurridos sobre todo durante la última década han afectado o en particular a la distribución demográfica al aumentar espectacularmente el número de personas de más de 85 años, como consecuencia del aumento en la expectativa de vida, especialmente en el mundo occidental.

Cataluña es una de las regiones más prósperas de España una en las que el número de personas de más de 65 años ha aumentado considerablemente. En 2010 su porcentaje fue de 16,49% y se estima que en 2041 llegarán al 26,63%.
Del total de personas de más de 65 años, los que viven en residencias de ancianos en Cataluña son el 4,69%. Sin embargo, sólo el 13% de estas residencias son públicas. El perfil de usuario es de una mujer mayor de 80 (78%) y con algún tipo de dependencia al hacer las actividades básicas de la vida diaria[2].

En razón a estos cambios demográficos de los últimos años, el número de personas mayores aumentará en las consultas dentales, así como aquellos pacientes con algún tipo de dependencia. Además sus necesidades de tratamiento dental son en general diferentes debido a las características especiales de su salud oral. Por ejemplo, la mayoría de ellos son completamente o parcialmente edéntulos, requiriendo de nuevas dentaduras o de la reparación de las antiguas. En general suelen tener mala higiene bucal, haciéndolos más susceptibles a la enfermedad periodontal y a incrementar el riesgo de padecer cáncer oral. Necesitamos recurrir a índices específicos para poder evaluar esas

diferencias y necesitamos prestar atención a su propia percepción de salud bucal, así como a su deterioro cognitivo para disponer de un plan de tratamiento acorde a sus necesidades específicas.

La razón por la cual decidimos llevar a cabo una encuesta epidemiológica es investigar cual es la salud oral de las personas mayores de 65 años en Cataluña que viven en residencias de ancianos, al igual que cuáles son sus necesidades de tratamiento y cómo perciben su salud oral, mediante el uso del GOHAI (General Oral Health Assessment Index). Adicionalmente quisimos averiguar si el deterioro cognitivo de estos pacientes influenciaba su estado dental dado que hay muy pocos estudios que evalúen esta relación.

Esperamos que el aporte de nuevos datos sobre la salud oral, necesidades de tratamiento y autopercepción de salud oral de los ancianos mayores de 65 años en Cataluña que viven en residencias, documente y justifique la creación de nuevas políticas sanitarias y preventivas hacia los ancianos.

HIPÓTESIS:

- Hipótesis nula (H_0):

3. La salud oral de los ancianos (mayores de 65 años) que viven en residencias de ancianos mejora (disminución del CAOD) conforme su deterioro cognitivo empeora.

4. También tienen una auto-percepción de salud oral muy buena (GOHAI >57).

MATERIALES Y MÉTODOS:

Seleccionamos 635 personas que vivían en residencias de ancianos en Cataluña, y los dividimos entre sus cuatro provincias: Barcelona, Tarragona, Girona y Lleida. El porcentaje de personas en cada provincia fue proporcional al

número de personas mayores de 65 años que constaban en el registro electoral al inicio del proyecto.

La selección de los residencias fue aleatoria, mediante el uso de una guía de residencias de ancianos en España proporcionada por la página web del IMSERSO. Contactamos con las residencias por teléfono y luego concertamos una cita con ellos para explorar a los pacientes que quisieron participar en el estudio. El director de cada residencia firmó un acuerdo aceptando todas las condiciones que nuestro Comité de ética había impuesto previamente (Anexo 5). Todos los voluntarios que participaron en la encuesta firmaron un consentimiento informado antes de darles la información acerca de la investigación escrita y verbal. Si el paciente tenía algún tipo de deterioro cognitivo, su correspondiente tutor legal firmaba el formulario de consentimiento. Hubo sólo un examinador durante toda la investigación para eliminar cualquier tipo de error entre examinadores.

Los índices que se evaluaron fueron tomados de la 4ª edición de las encuestas de salud bucal publicado por OMS[33].

1. Examen extraoral: Observamos si el paciente tenía úlceras, inflamación o fisuras en sus extremidades, cabeza o cuello, así como cualquier tipo de anomalías en la cabeza o los ganglios linfáticos.
2. Signos y síntomas en la Articulación Temporomandibular (ATM): comprobamos si el paciente tenía clics, dolor o reducción en la movilidad de la ATM.
3. Examen de la Mucosa oral: buscamos cualquier tipo de alteración, así como su localización.
4. Índice Periodontal Comunitario (IPC): Se dividieron ambas arcadas en seis sextantes y luego se analizó la condición periodontal de los dientes índice con una sonda periodontal OMS. Los posibles resultados eran: sano, sangrado gingival, cálculo, bolsas de 4 a 5mm, bolsas de más de 6mm o el sextante se excluía.

5. Pérdida de inserción periodontal: Usando los mismos criterios de evaluación del IPC evaluamos la pérdida de inserción. Los resultados oscilaban desde 0 mm hasta 12 o más.
6. Estado dental y necesidades tratamiento: revisamos todos los dientes del paciente y analizamos si tenían obturaciones, caries o estaban ausentes. Durante la exploración diferenciamos entre la corona y la raíz. Luego determinamos cuales eran las necesidades de tratamiento que requería cada diente.
7. Estado de la prótesis: analizamos si el paciente estaba usando algún tipo de prótesis, incluyendo dentaduras, puentes y/o prótesis implantosoportada.
8. Necesidades protésicas: analizamos si el paciente necesitaba cualquier tipo de prótesis, incluyendo puentes o dentaduras postizas.
9. Frecuencia de cepillado de los dientes: preguntamos a los pacientes cuántas veces se cepillaban los dientes. Las posibles puntuaciones variaban entre más de una vez al día y nunca (de menos a más).
10. GOHAI (General Oral Health Assessment Index)[25]: se trata de una encuesta de 12 preguntas sobre la propia percepción de salud bucal del paciente. Las puntuaciones iban de 1 a 5 usando una escala de Likert. Dividimos a los pacientes en dos grupos; si su puntuación final era ≤ 57 se clasificaron como mala autopercepción de la salud bucal y > 57 se clasificaron como buena autopercepción de la salud bucal. Esta clasificación fue sugerida por Pinzon-Pulido et al[28] donde probaron que pacientes con valores ≤57 necesitaban tratamiento por parte de un dentista en 74,4% de los casos, mientras que aquellos que tenían valores > 57 no necesitaban ningún tipo de tratamiento dental en el 90% de los casos.
11. Índice de Eichner[34]: se utilizó para saber cuántos contactos oclusales tenía el paciente. Este índice divide a los pacientes en tres grupos principales y cada uno de ellos en subgrupos:
    A. Contacto oclusal en las cuatro zonas funcionales:
        A1: Contacto oclusal en las cuatro áreas de oclusión (zonas de molares y premolares de ambos lados con dientes naturales) o de cualquier prótesis fija.

A2: Contacto oclusal en las cuatro áreas de oclusión (zonas de molares y premolares de ambos lados) con dientes naturales o cualquier prótesis fija pero con un espacio de 2mm o más en una de las arcadas debido a la pérdida dental.

A3: Contacto oclusal en las cuatro áreas de oclusión (zonas de molares y premolares de ambos lados) con dientes naturales o cualquier prótesis fija pero con un espacio de 2mm o más en ambas arcadas dentales debido a la pérdida dental.

B. Contacto oclusal en menos de cuatro zonas funcionales:

B1: Contacto oclusal en tres áreas de oclusión con dientes naturales o cualquier prótesis fija.

B2: Contacto oclusal en dos áreas de oclusión con dientes naturales o cualquier prótesis fija.

B3: Contacto oclusal en una área de oclusión con dientes naturales o cualquier prótesis fija.

B4: Contacto oclusal con los dientes anteriores (Ni molares ni premolares) con los dientes naturales o cualquier prótesis fija.

C. Ausencia de contacto oclusal:

C1: Ausencia de cualquier tipo de oclusión, pero con dientes en ambos arcos que no ocluyen entre sí.

C2: Ausencia de cualquier tipo de oclusión, pero con dientes en una sola arcada.

C3: Paciente totalmente edéntulo.

12. Índice de Pfeiffer[35]: utilizamos este índice para evaluar la capacidad cognitiva de cada paciente realizándoles 10 preguntas. Dependiendo de los errores del paciente lo clasificamos de la siguiente manera:
    - Sin deterioro cognitivo: de 0 a 2 errores.
    - Deterioro cognitivo leve: de 3 a 4 errores.
    - Deterioro cognitivo moderado: de 5 a 7 errores.
    - Deterioro cognitivo severo: de 8 a 10 errores.

Los resultados fueron procesados en un ordenador utilizando el programa de estadísticas SPSS Versión 20.0. Hicimos una estadística descriptiva incluyendo media, desviación estándar, rango intercuantil y mínimo y máximo.

Para evaluar la hipótesis nula relacionada con los objetivos del estudio, se usó la t-Student para variables independientes, test de Mann-Whitney y el coeficiente de correlación de Sperman dependiendo del tipo de variables analizadas.

El protocolo de investigación fue aprobado por la "Comisión de Investigación Ética del Departamento de Odontología de la Universitat Internacional de Catalunya".

RESULTADOS:

De las 635 personas evaluadas, 470 personas vivían en Barcelona, 59 en Girona, 42 en Lleida y 64 en Tarragona. El porcentaje de hombres y mujeres fue 25,98% y 74,02% respectivamente.

Durante el examen extra oral 83% no tenía ninguna anormalidad en sus extremidades ni la cabeza o el cuello, mientras que 11,8% tenía algún tipo de úlceras o erosiones en esas áreas del cuerpo. Sólo un 3,5% tenía fisuras en las comisuras de la boca.

Cuando revisamos la ATM, le preguntamos al paciente si tenían algún tipo de síntomas y sólo 6,6% contestó que sí. Durante el examen 32,1% de todos los pacientes tenían algún tipo de clic, 9,1% refirió dolor durante la palpación de la ATM y los músculos y un 33,5% tenía movilidad reducida de la mandíbula, es decir que no eran capaces de abrir la boca más de 30 milímetros.

La mayoría de los pacientes no tenían ningún tipo de alteración de la mucosa oral (67,7%), pero 21,7% tenían “otro tipo de alteración”; entre ellas podíamos encontrar desde hemangiomas a lengua fisurada o geográficas. El 3,9% tenía úlceras en la boca; en la mayoría de los casos éstas estaban causadas por prótesis dentales que no estaban ajustadas correctamente. También hubo otra alteración de la mucosa causada por las dentaduras que era Candidiasis (3.3%), debido a que los pacientes no suelen retirarse las prótesis por la noche. En la mayoría de los casos eran Candidiasis Newton tipo II. Las

principales localizaciones de estas lesiones de la mucosa oral eran en la lengua (54,5%) seguida de la cresta alveolar y encías (20,5%) y paladar duro y blando (11%).

La principal condición periodontal fue cálculo en un 24,25% de los sextantes, pero 66,79% de todos los sextantes fueron excluidos debido a que muchos dientes estaban ausentes. La mayoría de los sextantes incluidos en el estudio no tenía pérdida de inserción periodontal (18,47%) y sólo un 8,71% tenía pérdida de inserción de 4 a 5mm.

El CAOD (Dientes Careados, Ausentes, Obturados) de toda la población examinada para esta investigación fue 29,82. El número de dientes ausentes fue del 68,87%. Excluyendo éstos, el estado de la corona dental fue satisfactorio en el 54,11%% de los dientes, 11,34% tenían caries y un 12,71% de las coronas estaban obturadas.

Excluyendo los dientes ausentes, el porcentaje de las raíces expuestas que tenían caries fue del 19,51% y sólo el 0,99% de las raíces presentaban algún tipo de obturación. El porcentaje de raíces expuestas fue del 43,16%. El número de restos radiculares presentes en boca fue del 10,81%

La principal necesidad de tratamiento fue extracciones en un 16,14% de los dientes seguido de obturaciones en un 13,82%. Un gran porcentaje de los dientes no requería ningún tratamiento (67,84%).

Cuando revisamos el estado de la prótesis dental, el número de personas que no tenían ninguna prótesis dental fue del 43,8% para el maxilar y 52,4% para la mandíbula. El principal tipo de prótesis que llevaban los pacientes fueron las dentaduras completas para ambas arcadas (30,1% en el maxilar y 23,1% en la mandíbula) seguidos de prótesis parciales (15,3% en la arcada superior y 16,2% en la arcada inferior). El número de pacientes que no necesitaba ningún tipo de prótesis fue del 75,9% para el maxilar y del 74,5% para la mandíbula. Los pacientes necesitan principalmente dentaduras parciales (10,7% para el maxilar y 13,2% para la mandíbula) y dentaduras completas (11,7% en la arcada superior y 11,2% en la arcada inferior).

Adicionalmente les preguntamos a los pacientes sobre la frecuencia de cepillado de sus dientes o prótesis y 28,2% afirmó cepillarse más de una vez al día y un 33,4% dijo que sólo se los cepillaban una vez al día. Sin embargo 14,3% dijo que nunca se cepillaba los dientes. Encontramos una relación significativa entre el estado periodontal y la frecuencia de cepillado dental.

El índice de Eichner reveló que la mayoría de los pacientes eran completamente edéntulos en un 33,5% (C3) y sólo un 3,8% tenía todos sus dientes (A1).

La evaluación del estado cognitivo se realizó usando el índice de Pfeiffer. Los resultados revelaron que un 22,7% tenían una puntuación de 10, mientras que un 10,1% tenían una puntuación de 0, seguido por una puntuación de 3 en el 10,2% de la población. Encontramos una relación positiva entre el índice de Pfeiffer y la frecuencia de cepillado dental, el índice CAOD y el índice de Eichner.

Durante la evaluación del GOHAI, 41,9 % de ellos reportaron una mala autopercepción de su salud oral (puntuación ≤ 57), en contraste con el 29,9% que tenían una buena percepción de su salud oral (puntuación > 57). El resto de los pacientes no pudieron responder correctamente la prueba a causa de su deterioro cognitivo. Las únicas relaciones positivas que encontramos en relación al GOHAI fueron con el índice de Eichner y con la necesidad de prótesis dental en la arcada inferior.

DISCUSIÓN:

En nuestro estudio pudimos ver un 33,5% de pacientes eran edéntulos. Estos resultados son similares a la encuesta realizada en la misma región de España hace más de 20 años por Puigdollers[5,6] donde 37% de los pacientes eran completamente edéntulos. Otros estudios realizados en diferentes zonas de España obtuvieron resultados del 36,6% al 53%[36-40] de pacientes edétulos. Este promedio es similar en estudios internacionales que van desde el 30,6% a

48,9%[42-45]; Este porcentaje aumentó al 52,5% en personas de edad avanzada totalmente dependientes[45]. Debido a que muchos pacientes son edéntulos, el CAOD es generalmente muy elevado debido principalmente a los dientes ausentes. En estudios españoles el CAOD fue de 22,4 a 29,19[5,6,28, 35,36, 38,39,46,47] y aumentó hasta un 30,8 en una población geropsiquiátrica[47]; mientras que en estudios internacionales el CAOD fue ligeramente inferior de 22,2 a 28,8[24,49,52]. El número promedio de dientes remanentes fue entre 4,59 y 8,4[6,21,22,36,38,46].

La caries de raíz fue bastante frecuente en la población anciana debido a la recesión de las encías como probamos en este estudio en donde 19,51% de las raíces expuestas presentaban dicha lesión. En otros estudios el porcentaje de caries radiculares osciló entre 36% y 53%[6,37,58-60].

La principal necesidad de tratamiento dental en la población estudiada fue principalmente obturaciones y extracciones similar a otros estudios donde la necesidad para obturaciones era de entre 0,2 y 2,9 y para las extracciones de un 1,4 a un 3,9[6,36,45,61].

La principal condición periodontal encontrados en los ancianos institucionalizados fue cálculo en un 24,25% (código 2 del IPC), y comparándolo con otros estudios (sin tomar en cuenta los sextantes excluidos) la presencia de cálculo osciló entre un 44,7% y un 65,3%[36,37,39,43,46,64-65]. Otros estudios no utilizaron el IPC y utilizaron el índice de placa y gingival. Encontraron que el índice de placa fue del 2,3[60,66] y el índice gingival osciló entre 1,6 y 1,7[60,66]. Wu et al[64] describió que 70,97% de la población de su estudio tenían periodontitis y Ritchie et al[42] encontró que el 86% de la población anciana investigada tuvo sangrado de las encías, pero sólo el 4% de ellos tenía una recesión gingival superior a 3mm.

Encontramos resultados muy distintos en cuanto al uso de prótesis según el estudio revisado. Cortés et al[46], demostró que 70,8% de la población de su estudio usaba algún tipo de prótesis, de las cuales 35,7% eran prótesis completas y 11,4% prótesis parciales removibles en ambas arcadas, muy similares a los resultados de Iglesias-Corchero et al[40] donde 40% utilizaban prótesis completas. En la encuesta realizada por Velasco et al[47], sólo el 28,2% de los pacientes

desdentados llevaba un juego de prótesis completas y 89,3% necesita algún tipo de prótesis removibles; mientras que en el estudio de Ortolá et al[37], el 71,8% de los edéntulos utilizaban prótesis completas. Pinzón et al[38] por otra parte encontraron una muy baja utilización de dentaduras. Solo el 5,8% de los paciente usaba prótesis parciales removible y el 14,9% prótesis completas. En estudios internacionales encontramos también un gran disparidad en el uso o la necesidad de prótesis. Ritchie et al[42] describieron que el 75% de los pacientes desdentados llevaba dentaduras completas mientras Bush et al[45] afirmó que el 89,5% de ellos llevaba un juego de dentaduras completas pero sólo el 51,5% de la población dentado llevaba una prótesis parcial removible. Entre los que usaban prótesis dentales, el 61,7% había tenido su prótesis dental durante más de una década. Morishita et al[66] llevaron a cabo un estudio para comparar el uso de prótesis según la capacidad del paciente para hacer las actividades básicas de la vida diaria. El 74,4% de los pacientes que eran completamente independientes siempre utilizaban las dentaduras, mientras que sólo el 51,1% de los pacientes encamados las usaba siempre. Por otra parte Akar et al[63] concluyeron que 59,4% llevaban algunos tipo de prótesis, entre ellos 78,3% tenía dentaduras completas y 6,6% prótesis parcial removibles. También Schmitter et al[73] declararon que el 55,2% de la población institucionalizada llevaba dentaduras completas y 29,3% usaba prótesis parcial removibles.

En nuestro estudio utilizamos el índice GOHAI para evaluar la autopercepción de la salud oral de los pacientes y obtuvimos resultados similares al estudio realizado por Pinzón et al[28] donde concluyeron que lo más prevalente fueron los pacientes con un GOHAI ≤57 (68%). También pudieron detectar que entre estos pacientes, 98,5% de los casos requerían de algún tipo de tratamiento dental. Otros estudios calcularon el resultado promedio del GOHAI y encontraron resultados que oscilaban entre 32,1% y 33,03%[59,93]. En el estudio llevado a cabo por Atieh et al[93] concluyeron que aquellos pacientes que llevaban una prótesis removible tenían una puntuación de GOHAI significativamente más baja que aquellos que no usaban prótesis removibles, mientras que Mesas et al[59] afirmaron que la compensación por la pérdida de los dientes mediante el uso de prótesis había contribuido en una mejoría de la autopercepción del paciente. Con estos resultados podemos comprobar la necesidad de realizar este tipo de tests en

poblaciones institucionalizadas para poder obtener resultados más concluyentes en cuanto a la autopercepción de la salud bucal.

Por otra parte, otros estudios realizaban preguntas únicas sobre problemas al comer o al masticar, al hablar, al degustar, etc.. Por ejemplo, Simon et al[65] informaron que el 19% de la población estudiada tenía dificultades comiendo y el 25% las tenía con el gusto. La mayoría de los problemas fueron reportados por personas que tenían dientes y prótesis en lugar de los que sólo tenían dientes. Henriksen et al[60] reportaron en su estudio que un 31.4% respondía afirmativamente cuando se les preguntó acerca de si tenían problemas al comer o masticar, y observaron que era más frecuente en aquellos individuos que llevaban prótesis.

La oclusión no fue comprobada por casi ningún estudio, aunque Mesas et al[59] indicaron que el 27% de su muestra no tenía oclusión posterior.

Se encontraron muchas respuestas distintas en cuanto a la frecuencia de cepillarse los dientes dependiendo del artículo que revisamos. Por ejemplo, Akar et al[63] concluyeron que 31.9% se cepillaba los dientes tres veces al día mientras que un 31.7% nunca se cepillaba sus dientes. Por otra parte Pinzón et al[28] encontraron que en su muestra poblacional sólo el 12% no se cepillaba los dientes nunca.

CONCLUSIONES:

Hemos demostrado que hemos aceptado las dos hipótesis alternativas en cuanto a la evaluación del estado cognitivo como a la auto-percepción de salud oral. La salud oral de los ancianos mayores de 65 años que viven en residencias de ancianos en Cataluña empeora (aumento del CAOD) conforme empeora su deterioro cognitivo, al igual que tienen una mala auto-percepción de salud oral (GOHAI≤57).

En relación a los objetivos del estudio que redactamos al inicio de esta tesis podemos concluir que:

1. No se encontraron alteraciones extra-orales en un 83% de la población.
2. Aunque pocos pacientes reportaron síntomas en la ATM, cuando los exploramos, un 32,1% de la población tenían clicks y un 33,5% movilidad reducida de la mandíbula.
3. La mayoría de pacientes no tenían ninguna lesión oral. Aquellos que presentaban alguna solían ser lesiones relacionadas con la edad como lengua fisurada, o debido al uso de prótesis dentales como úlceras o candidiasis.
4. La condición periodontal más prevalente fue cálculo sin recesión gingival.
5. El índice CAOD de la población evaluada fue de 29,82, donde el componente Ausentes fue el más prevalente. 43,16% de las raíces estaban expuestas y casi el 20% de éstas presentaban caries radicular.
6. El principal tratamiento dental que requerían estos pacientes fueron extracciones seguido de obturaciones.
7. En relación al estado de las prótesis, la mayoría de los pacientes eran portadores de prótesis removibles y éstas eran también el tipo de prótesis que más necesitaban (cambiarlas o nuevas).
8. Aunque el 28% de la población se cepillaba los dientes más de una vez al día, un 14,3% no lo hacían nunca.
    - También encontramos una relación estadísticamente significativa entre el estado periodontal y la frecuencia de cepillado dental.
9. La mayoría de pacientes tenían una mala auto-percepción de salud oral.
    - También encontramos una relación entre GOHAI y necesidad de prótesis dental al igual que con el índice de Eichner.

10. Aún existe una alta proporción de paciente edéntulos en las residencias de ancianos (33,5%). Sólo el 3,63% tenían todos sus dientes presentes.
11. La mayoría de paciente presentaba un deterioro cognitivo severo.
    - Encontramos una relación estadísticamente significativa entre el estado cognitivo y la frecuencia de cepillado dental, el índice CAOD y el índice de Eichner.

PROPUESTAS PARA EL FUTURO:

Esperamos que, tal y como propusimos en la introducción de estas tesis, estos resultados documenten y justifiquen nuevas decisiones políticas en relación a la creación de programas de prevención y salud para las personas ancianas.