AN ORAL PATHOLOGICAL PROFILE FOR THE PREPROSTHETIC EVALUATION OF EDENTULOUS PATIENTS IN THE WESTERN CAPE OF SOUTH AFRICA AND THE IMPLICATIONS FOR TRAINING.

By

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September 2003

Declaration

I, the undersigned, declare that the work submitted in this thesis is my own original work and has not previously, in its entirety, or in part, been submitted at a tertiary educational institution for a diploma or a degree.

Signature: ____________________

Adriaan Claassen du Toit

Date: 20/02/2004

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Synopsis

This study explored the oral pathological conditions and related normal aberrations found within an *edentulous* sample group of the Western Cape of South Africa. The initial literature review concentrated on similar epidemiological surveys from a national and international perspective, from which a research framework was formulated and then applied to the chosen sample size.

Statistical analysis revealed the mean age of the sample group as 57,3 +/- 1 years and that the male, female ratio was 1:2.16. Results indicated that the percentage of healthy individuals were 78%. Normal aberrations such as *mobile alveolar ridge (flabby ridge)* (2,6%), *oral mucosal pigmentation* (1,9%), *chronic cheek chewing* (1%), *torus mandibularis and palatinus* (0,5%) had the highest incidence. Twenty three percent exhibited some sort of oral pathological condition such as *denture stomatitis* (7%), *ulcerations* (5,2%), *angular cheilitis* (1,8%), *white lesions* (4,4%), and *denture-related hyperplasia* (1,9%) were the most prevalent. Systemic diseases were recorded in 38,2% of patients; *hypertension* (22,7%), *heart disorders* (6,6%), *diabetes mellitus* (6,5%) and *asthma* (4,4%) were the most common. Individuals that exhibited oral pathoses were found to be wearing older dentures than individuals who replace their dentures more regularly. No significant difference was found between the age of the denture and the age of the patient.

The empirical investigation revealed that the number of prominent oral conditions was low for the Western Cape of South Africa and could perhaps be incorporated into an educational module for dental technologists. A better understanding of such oral pathological conditions may aid communication and patient service between the parties involved.

The concept of a more collaborative approach between the dentist and the dental technologists was discussed. Reference is made to a community service model that focuses more specifically on the needs of the poorer edentulous individuals of the Western Cape.

Sinopsis in Afrikaans

Hierdie studie behels onder andere 'n ondersoek aangaande mondpatologiese toestande wat spesifiek in tandlose individue van die Wes-Kaap van die Republiek van Suid Afrika kan manifesteer.

Statistiese bepalings, het aan die lig gebring dat die gemiddelde ouderdom van die proefgroep 57,3 +/- 1 jaar oud is en die geslagsverhouding van mans tot vrouens om en by 1:2,16 is. Daar is ook bepaal dat 78% van alle tandlose individue geen mondpatologie teenwoordig het nie. Natuurlike afwykings soos *tandvleis pigmentasie* (1,9%), *kroniese wangbyt* (1%), *geografiese tong* (0,5%), *torus mandibularis en torus palatinus* (0,5%) was die meeste teenwoordig. Van die ses honderd en sewentien tandlose individue, was daar 23%, wat die een of ander mondpatologie aanwesig was ten tye van die mondondersoek. Die mondletesels wat die mees prominent uit die opname voorgekom gekom het, was *gebitstomatitis* (7%), *gebitsverwante letsels* (5,2%) *angulêre cheilitis* (1,8%), *wit letsels* (4,4%), *mobiele alveolêre rif* (4,4%) *en gebitsverwante hiperplasie* (1,9%). Sistemiese siektes het in 38,2% van tandloses voorgekom, waarvan *hipertensie* (22,7%), *hartverwante kwale* (6,6%), *diabetes mellitus* (6,5%), *asma* (4,4%), mees algemeen voorgekom het. Geen betekenisvolle verskil was tussen die ouderdom van kunsgebitte en die ouderdom van die pasiënt gevind nie. Wat die resultate wel vorendag gebring het was, dat pasiënte met mondpatologie teenwoordig, se gebitte ouer was as die met gesonde monde.

Die proefnemingsresultate vir die Wes-Kaap van Suid-Afrika het aangetoon dat die omvang van die verwante mondpatologie nie groot is nie, wat dus bes moontlik in 'n onderigsmodule ontwikkel kan word. Indien tandtegnici 'n beter begrip van verwante mondpatologiese toestande het, kan 'n beter kommunikasievlak geskep word tussen die tandarts en tandtegnici, wat kan lei tot 'n beter diens aan die pasiënt.

'n Konsep wat 'n meer geïntergreerde samewerkings benadering tussen tandarts en tandtegnici voorstel volg. Ten slotte word melding van 'n voorgestelde konsepraamwerk vir die voorsiening van kunsgebitte aan mindergegoede gemeenskappe van die Wes-Kaap gemaak.

Chapter 1 Introduction

1.1 Statement of the problem

It has been a debate for many years between South African institutions of higher education that technikons do not prepare dental technologists to be professionally competent for the direct supply of full dentures to the edentulous. This debate stems from a perceived lack of clinical and pathological training received by the technikon student for such purposes. In addition, there appears to be a lack of uniformity, even amongst well-informed colleagues in the field, of how to adequately and uniformly describe conditions of oral pathology, and that formally recorded diagnoses may not necessarily reflect the subtle variety and deviation from medically understood conditions. There is also a concern that even if 'applied' oral pathology is addressed in the curriculum of the dental technologist, there would still be a lack of understanding, on the student's part, of adequate knowledge of the anatomical and physiological nature of the oral cavity, both on macroscopic and microscopic level. Such a lack of knowledge may also be apparent in the ability to interpret radiological information concerned with oral pathological conditions, or the influence and effect of systemic illnesses and medical treatment on the nature and structure of the oral cavity.

There are however influences, practices and patient needs in South Africa that perhaps warrant another approach to this scenario. A recent study by Hartshorne (1998) suggests that 8,9% of its population, or about 378 000 people, are edentulous in the Western Cape of South Africa. Present South African law allows only specialist prosthodontists and professional dentists to provide a denture service to the edentulous. There is thus a potential supply-demand situation that could lead to the proliferation of so-called 'quack' or backdoor denture providers, some of whom are already operational in various communities in the Western Cape. If an oral pathological profile could be

developed to facilitate a more orchestrated approach by dental technologists in providing full dentures, it could help with the problem of supply.

1.2 Sub-problems

1.2.1 First sub-problem

A dedicated oral pathological profile has not yet been developed to facilitate a more orchestrated approach by the dental technologist in providing full dentures to the edentulous. Some research work done on denture related oral mucosal lesions and temporo-mandibular complains by Hartshorne (1998), in addition to work done by Watermeyer (1979), Dreyer (1978), Nevalainen et al. (1997), Hoad-Reddick (1989) and Tobias and Smith (1989) would facilitate such approach.

1.2.2 Second sub-problem

The implications such a module of oral pathoses will have on the clinical knowledge needs of *paradental auxiliaries and subsequent issues* that may develop from this are partly unknown. It is supposed that the different approaches from dentists and dental technologists can contribute to serve a role in alleviating the denture need.

1.2.3 Third sub-problem

It appears that there is no official statutory interaction between dentists and dental technologists in their approach in their supply of full dentures. Perhaps the problem in this regard is the lack of a community service concept, incorporating all the relevant stakeholders in addressing this need.

1.3 Objectives of this research

Since a Technikon's prime mission is the focus of applied technology in a vocational sense, it was felt that this study might contribute towards a better understanding of the stated problem in the following ways:

1.3.1 First objective

This study, to a limited extent, attempts to define a possible oral pathological profile of common conditions for the edentulous specifically as diagnosed on patient folders by the University of Stellenbosch's School of Oral Health. An attempt is made to indicate the practicality and use of such a profile, taking note of the cautionary aspects from a university perspective.

1.3.2 Second objective

On preliminary basis, to investigate the academic relationship between the dentist and the training needs of dental technologist, and to further explore the influence that the concept of an oral pathological profile will have on the clinical knowledge needs identified with dental technologists. As part of the second objective, it is necessary to indicate formal guidelines for education, professional interaction with the edentulous individuals and identifying working alliances where dentists are incorporated.

1.3.3 Third objective

To recommend a structured system of community service in the full denture supply chain that would build on the knowledge gained from objectives one and two.

1.4 Delimitations of the research

The information for attempting to compile an oral pathological profile is limited only to patient folders of edentulous patients treated at the University of Stellenbosch's School of Oral Health. The process by which the information was obtained was rigorous and included the approval of ethical committees and agreement to non-disclosure of confidential patient information. Both the University of Stellenbosch (US) and the University of Western Cape (UWC) were approached with regard to the study, but UWC refused permission to use their files on the grounds of patient confidentiality.

The supplied information only deals with edentulous patients who visit the US School of Oral Health in the Western Cape. It must be noted that information for compiling oral pathological profiles could be regionally dependent, and that this has been taken into account in the present study.

The aspect of private versus public supply of such dental services has not been considered within this study.

1.5 Assumption

The primary assumption of this study is that the relevant sample data from University of Stellenbosch would be sufficient to obtain the relevant information required for a suitable oral pathological profile.

1.6 Significance of this research

The success in delivering dental health services to the public is dependant on how the responsible bodies manage the available dental personnel. However, misconceived ideas of the possible solutions to alleviate the denture demand entrenches only the current abilities of the different dental occupations in South Africa. Misconceptions and misunderstanding by all interested parties need to

be reviewed and redefined if necessary. By identifying factors from this study, responsible bodies may benefit in the planning of a more efficient dental service delivery system.

The currently applied research process could be valuable to other dental training institutions who may use the findings and results to evaluate their own views on related matters. From a dental technology point of view, a better understanding of the oral pathological conditions found and associated roles and the responsibilities of the various dental professionals could aide communication.

1.7 Outline of the study

Chapter one serves as the proposal for this submission, which highlights the problem to be researched and spells out how the project will be organized and executed.

Chapter two includes findings by authors of related oral pathological surveys and the occurrence of oral mucosal lesions that were compared and reviewed.

Chapter three covers the preparation, planning, implementing, and review of the empirical investigation conducted. The designs of questionnaires and logistical considerations are discussed and structural design is set out.

Chapter four discusses the results of this study, communicating the observation and interpretation of results obtained within the sample group surveyed. A complete oral epidemiological discussion is contained in this chapter with respect to the statistical analysis performed.

Chapter five discusses the implications of an oral pathological profile in an extended concept of dental community service.

Chapter six concludes this study with some recommendations for further research.

Chapter 2 Literature review

2.1 Overview of related oral pathological surveys

A literature review was conducted, manually and on the international medical search facility and database, WinSPIRS® 4.0 edition MEDLINE (Published by Silver Platter), to identify attributing oral pathological and epidemiological survey results. The aim was to identify publications indicating the prevalence of oral pathoses in the *edentulous* patient. In several oral epidemiological studies, the prevalence of oral pathological conditions are listed, either by comparing the results with earlier studies or a similar survey conducted in a different country. In these studies, the percentage of normal healthy subjects was not always stated clearly. The results of Lin, Corbet & Lo (2001) and Kuc et al. (1990) compelled the author to make deductive calculations to obtain the sample group that was without any existing oral pathological conditions. The literature survey concentrated on similar oral epidemiological studies performed locally and internationally.

2.1.1 International surveys

In *Kuc et al. (1990)* 53% maxillary and 57% mandibular appliances exhibit poor hygiene. The mean age of 70.9 ± 2,6 years of age correspond to the age denture-wearing becomes more prominent. The high incidence of edentulous individuals in this study opted for the inclusion in the overall comparison.

Due to the high average age at 69,1 ± 7,3 years of age of the respondents that correlates to the age, edentulousness becomes prominent, *Taiyeb Ali et al. (1995)* was included in the comparison. According to the discussion, the Malaysian sample group corresponds in many ways to the Western Cape edentulous group.

Tobias & Smith (1989) documented a seventy-one percent of institutionalised edentulous individuals in West Essex in the United Kingdom. Direct relevance to the *Watermeyer survey (1979)* validated the inclusion in the final comparison. Seventy-one percent of individuals included in this study were edentulous, one of the few studies with a large segment of edentulous patients that could be compared to the current study.

The oral mucosal and health survey of *Nevalainen* et al. *(1997)* undertaken with home living elderly individuals as sample group, corresponds to a similar study *Watermeyer (1979)* did on white, elderly institutionalised individuals. Comparison of these results could give an indication of the validity of the two oral profiles respectively. The *Nevalainen* et al. *survey (1997)* included fifty-one percent of edentulous individuals and thirty-one percent partial denture wearers.

Corbet et al. *(1994)* examined community-dwelling Chinese geriatrics, living in Hong Kong, between the ages 65-74 years of age. The direct similarities between this sample group and the current study reported on, is the main reason for the inclusion in the comparison.

The study of *Cumming* et al. *(1990)* was one of the studies in which denture stomatitis was studied in more detail in an elderly sample group. A large percentage of edentulous geriatrics was incorporated into the sample group and the result obtained had enough depth so that the current survey results could easily be tested.

The data *Jorge* et al. *(1990)* obtained in their study was similar to the data to be retrieved in the current study. Overall similarities were identified.

The study of *Moskona & Kaplan (1992)* was included in the survey comparison because of the almost 63% edentulous individuals as part of the sample group. The results of this study can directly be compared with that of the proposed study.

2.1.2 South African surveys

To the best of my knowledge, no other similar studies of oral health survey in a South African edentulous group were performed, although studies have been done on specific ethnic groups. A discussion follows with reference to related overall oral pathological and epidemiological surveys that included decayed, missing and filled index (DMFT index) relating to teeth present. The only associated surveys found that contained a large edentulous segment in the sample group were the following three:

Dreyer (1978) documented the oral disease pattern in a Cape Malay sample group, in which edentulous individuals were included in the study. This study documented the environment and the background of these individuals and gave a detailed analysis of all related oral pathological conditions found.

Watermeyer (1979) examined the oral health status of white, elderly institutionalised individuals in the Cape Peninsula. Watermeyer's (1979) sample group did not consist entirely of edentulous individuals, but made up a large segment of denture wearers that were examined in the study.

Hartshorne (1998) compiled a feasibility study exploring denturism as a new dental occupation in South Africa. This was the most recent oral pathological evidence found. The compilation of an oral pathological profile was not a main objective in his study. He, nevertheless, compiled the most recent oral pathological profile of the denture wearers in the sample group viewed. Although the sample group in this particular survey was not entirely composed of the edentulous, the results obtained gave insight into the oral

pathoses manifesting in the denture-wearing community. This profile was identified as a departing point for this study. Finding any evidence in the literature on surveys consisting solely of edentulous individuals in South African was fruitless.

The aim of this literature search was to group oral pathological conditions of the soft tissue in order of occurrence and prominence. The initial search was broadened to include any similar oral epidemiological and pathological surveys previously done elsewhere in the world where the sample group comprised mainly of geriatric and/or adult individuals. The result of this search indicated that globally, oral pathoses in an overall population sample group is well documented but rarely targets specific groups, like the edentulous community.

2.2 The occurrence of normal edentulous oral tissue condition

Winkler (1994) described a *normal edentulous oral tissue condition* as follows: Intra-oral mucosa is situated in a transitional area that possesses certain characteristics associated with internal tissue. However, this oral tissue is subjected to a different environment closer to the outside of the body, which shows similarities to that of skin.

The oral cavity is lined with the stratified squamous epithelium type that is associated with the function and environment of the intra-oral area. Certain areas in the mouth are more prone to keratinisation and as a result, variations occur. The crest of the mandibular and maxillary ridge, and palatal area has to withstand masticatory forces and as a result will be more keratinised than the buccal or sub-lingual area that is somewhat protected. Differences in membranes often occur, these vary from thick and resilient to thin and atrophic mucous membranes.

Winkler (1994) further described normal oral mucosa as pinkish pale in colour, moist and very flexible. When pressure is applied on the ridge areas it will turn pallid white, when pressure is released it will return to its original pinkish colour. The buccal area can be gripped, twisted and turned without any difficulty or pain. The extra-oral skin possesses the same degree of flexibility and, if twisted, returns to its normal state.

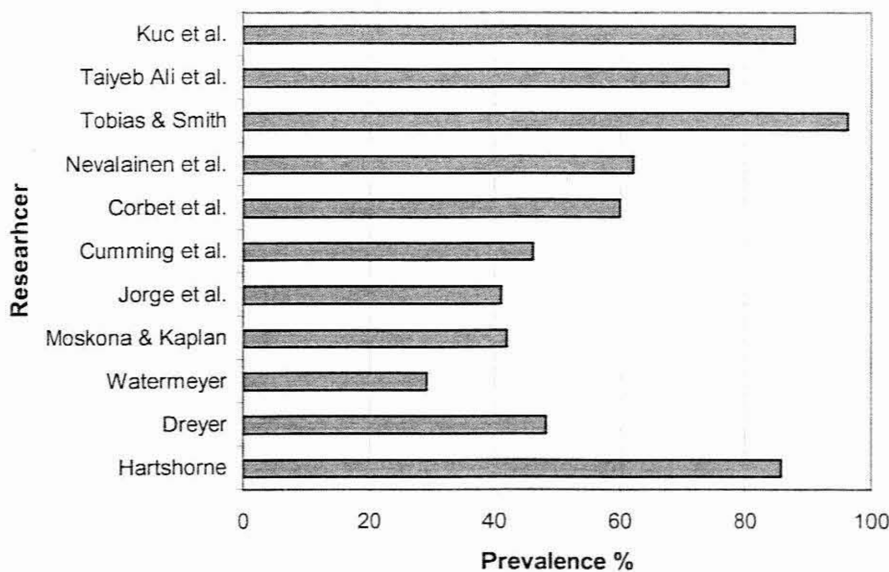

Figure 2-1. Occurrences of individuals without oral mucosal lesions in different sample groups

In the scope of this study, the percentage of individuals that were found without any oral pathological conditions represents the percentage of healthy dental individuals. In most of the oral epidemiological surveys as shown in figure 2-1, individuals with no oral pathoses made up the biggest segment in each sample group. This value varied widely as Jorge et al. (1990) indicated with 41% of the 270 Brazilian institutionalised elderly patients evaluated compared to 96% of the 107 edentulous patients in West Essex, England studied by Tobias & Smith (1989). While Lin et al. (2001) found 82% of the 1515 elderly Chinese patients to be without oral pathoses.

Results from local surveys differed widely as indicated in figure 2-1; Hartshorne (1998) indicated that 85,7%, Dreyer (1978) 48,1% and Watermeyer (1979) 26,4% of individuals were without any oral lesion.

2.3 Location of lesions

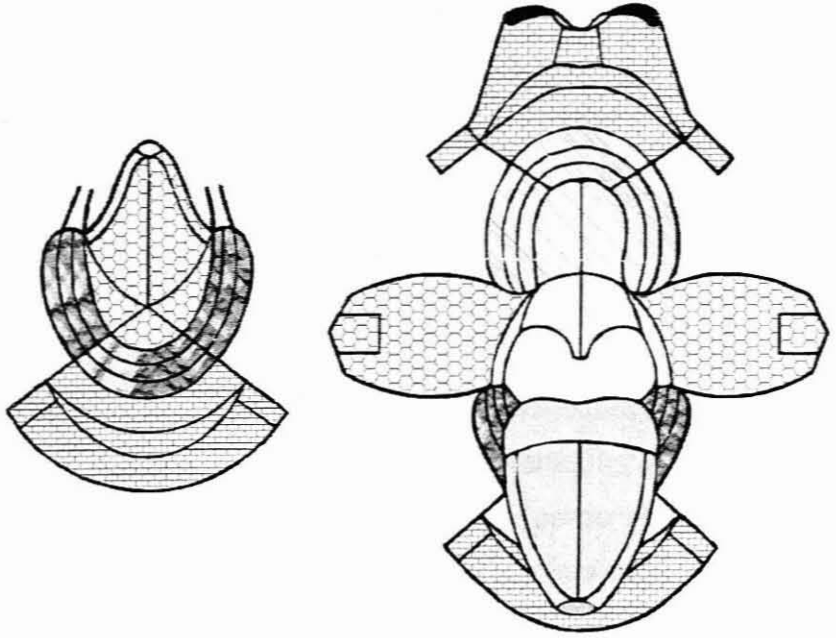

Figure 2-2. Schematic diagram of the oral environment

Table 2-1. Location of oral lesions

						RSA avg.	International avg.
Normal aberration	**Maxillary fitting surface**	**Mandibular fitting surface**	**Tongue area**	**Sulcus and buccal**	**Extra oral**	%	%
2.4.1 Geographic tongue			•			1.58	0.25
2.4.1 Fissured tongue			•			0.01	2.8
2.4.2 Mobile alveolar ridge	•	•				0.86	2.2
2.4.3 Oral mucosal pigmentation	•	•		•	•	0.7	1.15
2.4.4 Torus palatinus	•					0.58	0.08
2.4.5 Torus mandibularis		•				0.58	0.08
2.4.6 Chronic cheek chewing				•		0.25	0.38
2.4.7 Active frenum	•	•				0.08	0.02
2.4.8 Macroglossia			•			0.05	0.16
2.4.9 Cleft palate	•					0.16	0.08
2.4.10Sublingual varicosity				•		3.2	0.08
No oral pathoses						**53,4**	**60**
Oral pathoses						**46.6**	**40**
2.5.1 Denture stomatitis	•	•			•	18	18
2.5.2 Angular cheilitis					•	3	7.5
2.5.3 Fibrous denture hyperplasia	•	•				5.5	8
2.5.4 Oral ulceration	•	•	•	•		3.5	2.9
2.5.5 White lesions	•	•	•	•		6	0.8
2.5.6 Denture related lesions	•	•	•	•		25	4.6
2.5.7 Frictional keratosis	•	•	•	•		0.6	2.3-
2.5.8 Lichen planus			•	•		-	0.2
2.5.9 Tongue related pathoses			•			1	0.8
2.5.10 Leukoplakia	•	•	•	•		1.8	-
2.5.11 Oral cancer	•	•	•	•		-	0.2

2.4 The occurrence of normal aberrations and related conditions

Normal aberrations are conditions that are commonly found within the oral cavity, which cannot necessarily be classified as oral pathoses and are mostly not caused by a relevant underlying illness or infection.

2.4.1 Geographic tongue and fissured tongue

Geographic tongue is a mostly painless tongue disorder with inheritance as a possible cause. It forms multiple circular erythematous islands surrounded by a thin raised white border that may vary in size. Jorge et al. (1990) described a prevalence of 0.4% in elderly patients. In the same study, they recorded a 7,8% prevalence of an asymptomatic, developmental malformation of the tongue called *fissured tongue*. Laskaris (1994) mentioned that it usually coexists with geographic tongue and forms multiple wrinkle-like fissures that may vary in size and depth. Food debris and micro-organisms may accumulate in the fissures and cause mild irritation as Laskaris (1994) showed. Watermeyer (1979) identified geographic tongue in 3,2% of individuals examined. Other South African surveys failed to indicate the presence of geographic tongue or fissured tongue.

2.4.2 Mobile alveolar ridge (Flabby ridge)

Budtz-Jørgensen (1981) argued that *mobile alveolar ridge* also known as alveolar fibrosis is due to the replacement of bone by mainly fibrous tissue complicating successful denture provision. A *mobile alveolar ridge* condition provides a poor support for removable dentures and may complicate impression taking. This condition would contra-indicate the treatment by a dentist or denturist and should be referred to the oral surgeon to be surgically corrected. Moskona & Kaplan (1992) documented this condition at a prevalence of 23,8% in an Israeli geriatric group. Even though fairly common among edentulous individuals, related South African surveys failed to indicate the presence of this condition among the denture-wearing groups examined.

2.4.3 Oral mucosal pigmentation

Oral mucosal pigmentation is an asymptomatic condition found in healthy black and dark skinned persons. The degree of pigmentation may vary in colour from black to brown as well as in size. Laskaris (1994) argued that the gingival, palatal and buccal mucosal are common areas where it is found but less often on the tongue and sub-lingual areas. This condition manifested in 8,9% of the 270 aged Brazilian denture-wearing patients Jorge et al. (1991) examined as opposed to the 1% of the 537 Hong Kong Chinese denture-wearing patients Corbet et al. (1994) examined. The results of Garcia-Polo Vallejo et al. (2002) identified this condition in 7,9% of Spanish adults and correspond to the results of Jorge et al. (1991). Other South African surveys reviewed, failed to report the presence of this condition.

2.4.4 Tori

Torus mandibularis is an exostosis that occurs as a prominence on the lingual aspect of the mandible opposite the mental foramen as Laskaris (1994) illustrated. The growth is extremely slow, usually, but not always, bilateral, and becomes noticeable at a later age, and according to Stones (1951), mostly discovered by accident during normal oral examination.

Torus palatinus as described by Stones (1951) is a bony overgrowth in the midline of the hard palate typically towards the posterior aspect. According to Laskaris (1994), the exostosis is benign, may vary in size and consists of osseous tissue covered with normal mucosa. Dreyer (1978) identified this condition with no significant difference in four of the 325 males and in five of the 434 female Cape Malays examined, whereas other South African surveys failed to report on the presence of similar osseous overgrowths.

2.4.5 Chronic cheek chewing (Morsicatio buccarum)

Laskaris (1994) explained that these patients consciously bite the buccal mucosa, tongue, or lips and tear off the superficial epithelial layers. A diffuse irregular area of small furrows and a whitish surface characterise this lesion. The normally thin epithelium in the buccal and sub-lingual areas will become thickened and keratinised if cheek biting occurs. Chronic cheek chewing is more commonly found within anxious persons or caused by dentures with faulty occlusions. Although Garcia-Polo Vallejo et al. (2002) identified this condition in 1,6% *of Spanish adults, related South African oral survey results failed to* indicate the presence of this condition.

2.4.6 Active frenum

This developmental soft tissue defect causes obstruction of the normal fit of a denture in any frenum area. In some cases surgical correction may be needed. Other South African surveys failed to indicate or report on the presence of this condition.

2.4.7 Macroglossia

Macroglossia is an uncommon developmental anomaly of the tongue that gives rise to much diagnostic speculation. Neville (1995) mentioned that an enlarged tongue might result in lisping speech, an open bite and crenated lateral borders of the tongue. Laskaris (1991) indicated *macroglossia* is strongly associated with Down's syndrome cases, although not reported on in similar South African oral epidemiological surveys. In normal individuals this condition is rarely found.

2.4.8 Cleft palate

Cleft palate a developmental malformation of the middle third of the face or as Scully (1999) describes, the incomplete fusion of facial growth processes that affect about one per 1000 births. The cause however remains unknown, although heredity may play a role as Laskaris (1991) indicated. Serious feeding, speech and psychological problems may occur as result. The other South African surveys failed to indicate or elaborate on the presence of this condition.

2.4.9 Sublingual varicosities

Burket (1952) mentioned that the distinction of the lingual veins is an indication of poor circulation and as a result, the lingual veins develop *varicosities* that may become tortuous. Corbet, Holmgren & Philipsen (1994) identified this condition in 4% of the 284 Chinese denture-wearing patients examined. Hoad-Reddick (1989), and Dorey et al. (1985) both identified this condition in 1% of their distinctive sample groups examined. Other South African surveys failed to indicate the presence of this condition. Dreyer (1978) however mentioned that this condition could be considered a common feature of aging.

2.5 The occurrences of oral pathoses within denture wearing sample groups

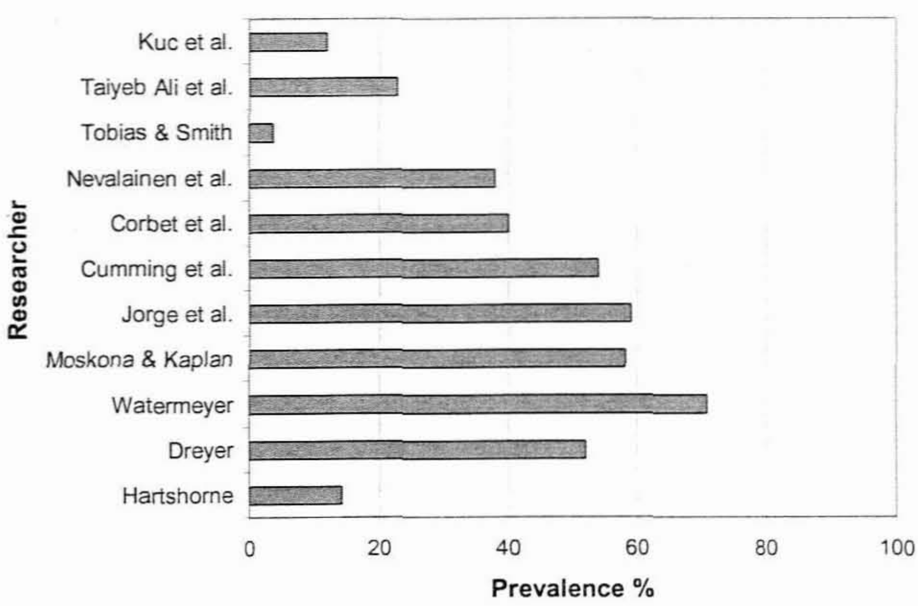

Figure 2-3. Occurrences of oral pathoses

The oral pathological conditions found during the literature search are listed in order of prevalence, from most prominent to least. Figure 2-3 indicates the overall occurrence of oral pathoses in studies within the literature. Previous studies on Caucasian populations indicated that the denture age, denture-wearing habits and denture cleanliness are important factors that are related to the development of prominent oral pathoses. Due to social, dietary and cultural differences, it is open to speculation whether these factors may have affected this multi-racial sample group similarly. Jorge et al. (1991) indicated that the age of the denture has a direct relation to, for example, denture stomatitis found.

2.5.1 Denture stomatitis

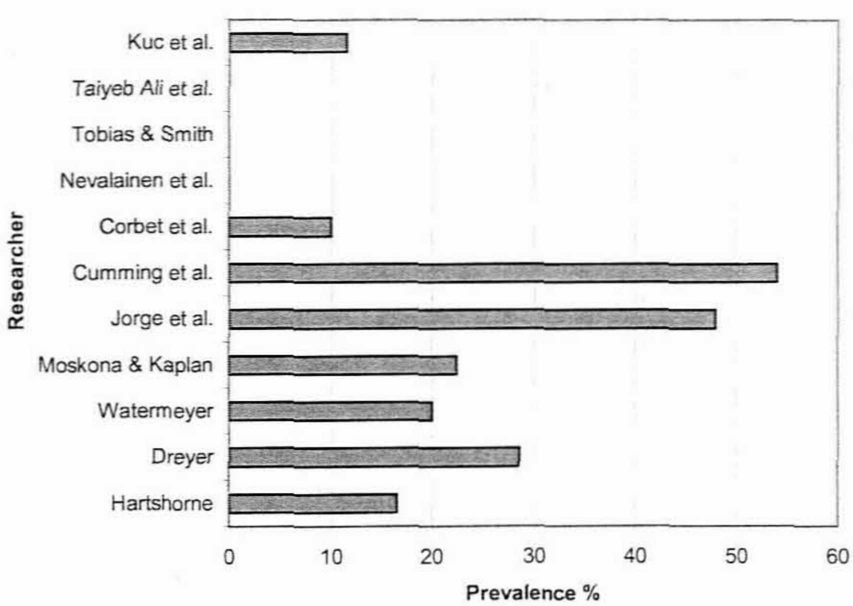

Figure 2-4. Occurrence of denture stomatitis

Both, Winkler (1994) and Budtz-Jørgensen (1978 & 1981) indicated that denture stomatitis is one of the most prominent oral pathological conditions found in elderly patients wearing complete dentures. *Denture stomatitis* or *denture sore mouth* is a frequent burning sensation occurring in denture-wearing patients with poor oral hygiene that may occasionally involve the tongue.

Not all authors classified denture stomatitis, however, in 1962 Newton suggested the following classification:

i. *Pinpoint hyperaemia* is found around orifices of the palatal mucous gland ducts and manifest as small pinpoint inflamed areas surrounded by normal tissue. Hartshorne (1998) found this condition present in 23% of the 1787 South African patients examined, whereas Moskona & Kaplan (1992) found 5% and Dorey et al. (1985), 4% of their sample groups to exhibit pinpoint hyperaemia respectively.

ii. *Diffuse erythema* is an inflammation of the large parts of the denture-bearing areas of which the mucosa is smooth and where slight trauma can cause bleeding. Hartshorne (1998) identified this condition in 50% of all denture-wearing individuals in the Western Cape of South Africa in contrast to Jorge et al. (1990), and Cumming et al. (1990) who found this stage respectively in 17,7% of Brazilian- and 14,8% of Scottish denture-wearing patients. Dorey et al. (1985) and Hoad-Reddick (1989) found similar results with a prevalence of 2% and 3% correspondingly.

iii. *Granular hyperaemia* (Granular hyperplasia) is often restricted to the central part of the palate but may involve the entire denture-bearing area and has a granular surface as result of papillary hyperaemia of palatal mucosa. Hartshorne (1998) found this condition in 27% of the 1787 South African denture wearers he examined and Dreyer (1978) in 2,6%, whereas Jorge et al. (1990) and Cumming et al. (1990) found a similar result of 5,3% and 5,7% prevalence respectively. However, Dorey et al. (1985) identify granular hyperplasia in 12% of Canadian denture wearers examined.

If *denture stomatitis* is seen as a single pathology recorded, the occurrence of this condition varied widely with Jorge et al. (1990) and Cumming et al. (1990) who found similar results of 47,8% and 54% respectively (See figure 2-4.) However, Corbet, Holmgren & Philipsen (1994) indicate a prevalence of 10% within elderly Chinese denture wearers. Garcia-Polo Vallejo et al. (2002) and Dorey et al. (1985) found similar prevalence values of 30,1% and 26% respectively. Budtz-Jørgensen (1978) stated that most cases are treated relatively easily, but preventive measures should be taken to prevent colonization by *Candida* in the oral cavity. Continuous good, oral health would be the most effective in this regard. Results from local oral surveys differed somewhat, as Hartshorne (1998) indicated 16,5% prevalence, Dreyer (1978) identified 20% as opposed to Watermeyer (1979) who found 28,5% of individuals that presented with *denture stomatitis*.

2.5.2 Angular cheilitis

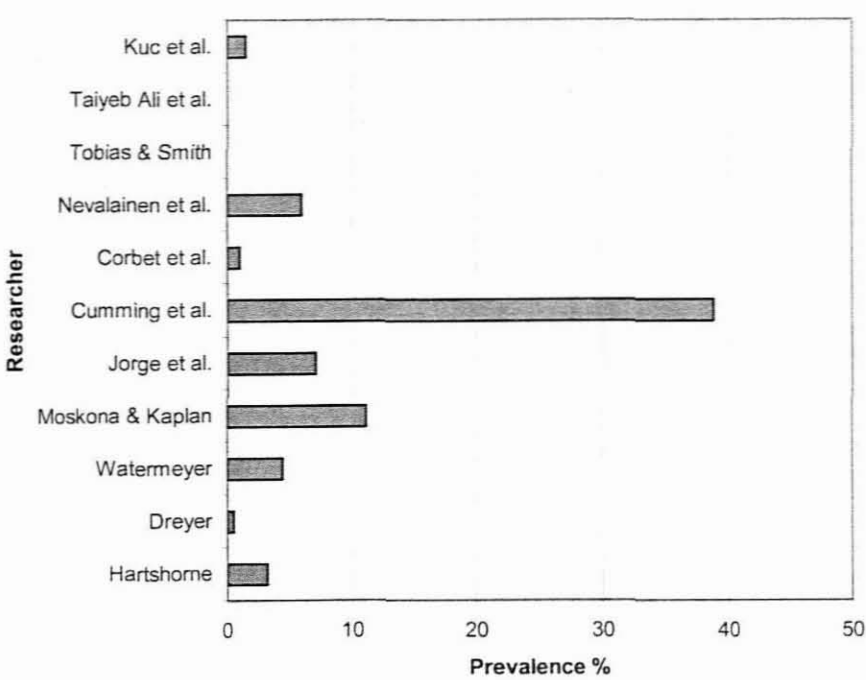

Figure 2-5. Occurrence of angular cheilitis

Tyldesley (1991) described *Angular cheilitis* as a *Candida-related* condition that involves dryness, crusting and occasional bleeding at the commissures, accompanied by a burning sensation. Literature also indicates that a vitamin B deficiency may be a predisposing factor for this lesion to develop. Budtz-Jørgensen (1981) mentioned that these lesions are more prominent in non-institutionalised subjects than in the institutionalised corroborate and that the latter receive a more balanced diet and bare a better overall oral health.

Figure 2-5 shows the occurrence of angular cheilitis to vary between 1% to almost 40% in different sample groups. According to Cumming et al. (1990), this condition was present in 38,8% of edentulous elderly patients he examined as opposed to Corbet, Holmgren & Philipsen (1994) who identified angular cheilitis in 1,0% of elderly Chinese denture wearers. Nevalainen, Närhi & Ainamo (1997) found angular cheilitis in 6% of the 338 Finnish patients examined. Similarly,

Watermeyer (1979) and Hartshorne (1998) found this condition in 4,5% and 3,3% respectively in a South African denture-wearing community. It is open to speculation if this condition would hinder the denture provision process in any way.

2.5.3 Fibrous denture hyperplasia

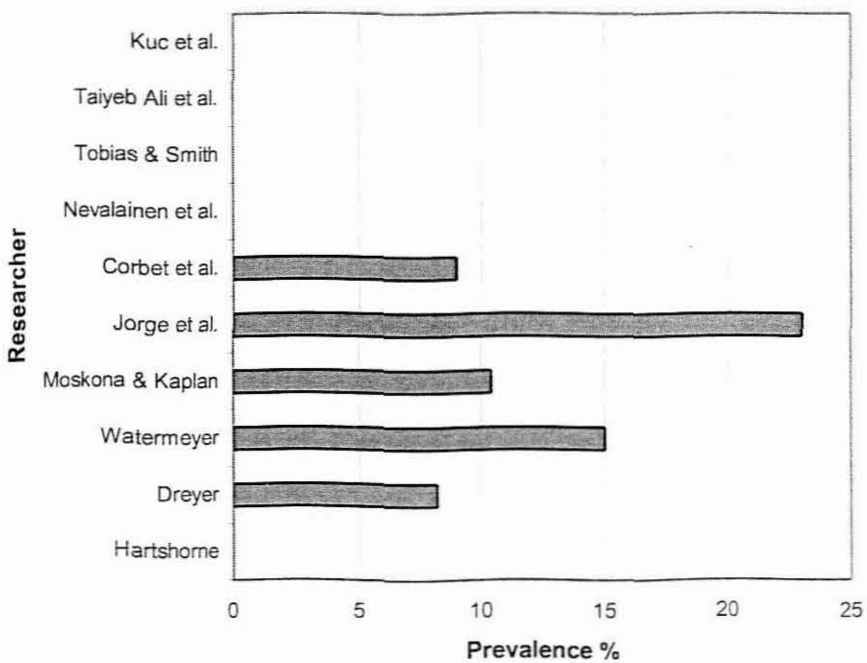

Figure 2-6. Occurrence of fibrous denture hyperplasia

Fibrous denture hyperplasia, also known as denture irritation hyperplasia as described by Laskaris (1994) as a condition caused by ill-fitting dentures worn for long periods. Budtz-Jørgensen (1981) revealed that this common condition is generally caused by chronic injury through unstable dentures or by thin, overextended flanges. *Epulis fissuratum* or *granuloma fissuratum,* is a similar condition caused by ill-fitting dentures and manifests as multiple or single inflamed, elongated papillary folds that usually form in the mucolabial, mucobuccal and on the edentulous alveolar ridge area as Laskaris (1994) described. The condition must be referred for specialized treatment.

Moskona & Kaplan (1992), and Jorge et al. (1990) recorded equal results, with 10,4% and 11,8% respectively. Hartshorne (1998) documented an incidence of 2,48% in a South African survey and Dorey et al. (1985) found a similar prevalence of 2% in a Canadian survey (See figure 2-6.)

2.5.4 Oral ulceration (not otherwise specified)

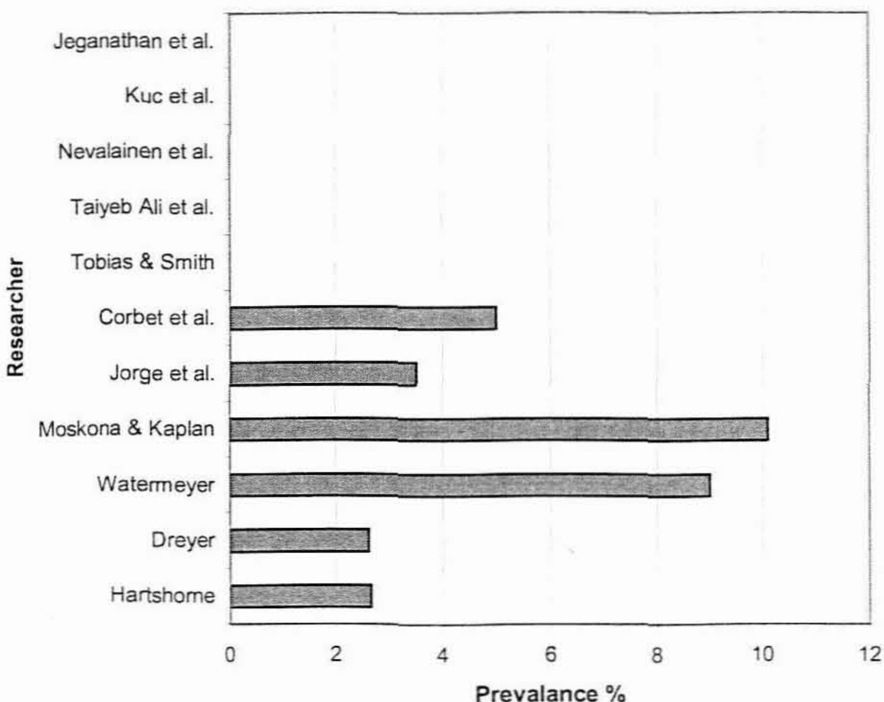

Figure 2-7. Occurrence of oral ulceration

The Dorland's medical dictionary (2000) described *oral ulceration* as a local inflammation of the tissue that occurs along with sloughing of inflammatory necrotic tissue. Moskona & Kaplan (1992) documented a prevalence of 10,1% in an elderly denture-wearing sample group as opposed to the South African researchers Hartshorne (1998), and Dreyer (1978) who documented lower incidences of 2,64% and 2,6% respectively among denture-wearing patients in the Western Cape as indicated in figure 2-7. Watermeyer (1979) however identified *oral ulceration* in 9% of the 453 denture wearers, in line with the result of Moskona & Kaplan (1992).

2.5.5 White lesions

Watermeyer (1979), and Dreyer (1978) identified *white oral lesion* in 6,2% and 6% respectively in the two different South African sample groups examined. Several authors classified different oral pathoses that appeared whitish in colour at the time of examination under the heading of "white lesions".

2.5.6 Denture-related lesions

Denture-related lesions refer to any lesions that have developed in the oral cavity where a denture was the predisposing reason for the lesion to form, for example ulcerations, fibrous denture hyperplasia denture stomatitis and frictional keratosis. In some instances when dentures are worm, angular cheilitis can also be included as a *denture-related lesion*. These lesions can usually be brought into a direct area or dysfunction of the denture. Taiyeb Ali et al. (1995) identified these lesions in a Malaysian geriatric sample group at a prevalence of 6,4%. Watermeyer (1979) indicated a much higher prevalence of 45% whereas Dreyer (1978) documented a prevalence of 23,8% of the 340 edentulous patients examined.

2.5.7 Frictional keratosis

Corbet, Holmgren & Philipsen (1994) identified *frictional keratosis* at an incidence of 6% in a Chinese denture-wearing sample group. According to Neville et al. (1995), it presents as small plaques of greyish epithelium on the alveolar ridges. Frictional keratosis is caused to an area that becomes edentulous, where mastication normally traumatizes the posterior mandibular ridge. Garcia-Polo Vallejo et al. (2002) recognized *frictional keratosis* in 9,5% of Spanish adults examined, whereas Dorey et al. (1985) diagnosed similarly at a prevalence of 12% in an elderly Canadian sample. According to the South African surveys, Dreyer (1978) recorded a prevalence of 2,6% whereas Watermeyer (1979) indicated with an omissible prevalence of 0,02% of all

denture-wearing patients examined. Other South African surveys failed to indicate the presence of this condition.

2.5.8 Lichen planus

Lichen planus, according Laskaris (1998) is a chronic inflammatory disease of the oral mucosa and skin that forms groups of white papules that usually coalesce to form a network of lines. Similar results were present in the sample groups examined by Lin et al. (2001) and Corbet et al. (1994) who indicated a 5,5% and 4% prevalence respectively. South African surveys failed to indicate the presence of this condition among denture wearers.

2.5.9 Tongue-related pathoses

Nevalainen, Närhi & Ainamo (1997) found *coated changes of the tongue* in 7% of 165 Finnish denture-wearing patients and Hartshorne (1998) documented a 0,17% incidence of *tongue lesions* among a South African sample group. It was not specified in the above-mentioned study which tongue lesion was found. Garcia-Polo Vallejo et al. (2002) and Taiyeb Ali et al. (1995) identified *tongue lesions* at a prevalence of 7% and 10,7% respectively. In other South African surveys, Watermeyer (1979) indicated that 28% of all the patients examined exhibited some form of tongue-related abnormality or pathology, as opposed to Dreyer (1978) who indicated a 0,8% prevalence and documented a 0,4% prevalence of *coated changes of the tongue*. Dreyer (1978) also indicated that hairy tongue was present in 0,4% of edentulous patients, very similar to the 0,3% Watermeyer (1979) found. Other tongue related lesions Dreyer (1978) identified were central papillary atrophy and hairy tongue.

2.5.10 Leukoplakia

The Dorland's medical dictionary (2000) describes *leukoplakia* as an oral lesion marked by thickened white patches that are most often observed on the mucous membrane of the cheeks, that cannot be rubbed off and that sometimes become malignant. Jorge et al. (1990) documented a 3% incidence in a Brazilian oral survey and Hartshorne (1998) 0,33%, whereas Dorey et al. (1985) found a similar prevalence of 0,5% in a Canadian sample group that comprised of 200 edentulous individuals. A recent study of Garcia-Polo Vallejo et al. (2002) identified *leukoplakia* in 1,6% of Spanish adults examined, whereas Hoad-Reddick (1989), and Dreyer (1978), documented a slightly higher prevalence of 7% and 7,2% respectively. Bernitz & Ligthelm (1993) found 3,33% prevalence in a study done where private dental practice patients were examined, that did not necessarily comprise only denture wearers.

2.5.11 Oral cancer

Taiyeb Ali et al. (1995) identified some sort of *oral cancer* in 0,4% of the 139 geriatric patients examined. In the published version of this particular study, no mention was made regarding the specific area or a predisposing cause of any sort.

2.6 The occurrence of oral pathoses within HIV positive sample groups

During the course of the literature survey into oral epidemiological surveys, it became evident that numerous studies had been performed to determine the oral mucosal conditions likely to occur in HIV positive individuals. One shortfall that was identified was that the literature failed to indicate surveys where the sample groups comprised as part or entirely of edentulous individuals. However, the prominence of HIV/Aids currently, prompted further investigation into HIV-related pathoses that could manifest in the edentulous oral environment.

Oral pathological surveys referred to in the text below are prominent surveys done across the globe. Within the South African context, the most prominent studies identified were that of Arendorf et al. (1998) who examined 600 HIV-infected patients in Cape Town, and Kamiru & Naidoo (2002) that assessed 270 patients with serological diagnosis of HIV infection in a hospitalised Lesotho sample group.

Both the results of Arendorf et al. (1998) and Kamiru & Naidoo (2002) were relied on heavily, in this section, in the attempt to group prominent oral pathoses that manifest specifically in the HIV/Aids infected of South Africa.

2.6.1 Candidiosis

Newton (1962) classified this fungal infection into three stages, as discussed in 2.5.1. According to Clearinghouse (1993) *Candidiosis* is of the genus *Candida;* one of the conditions strongly associated oral conditions and most prevalent in HIV-infected patients. The results from Arendorf et al. (1998) and Barone et al. (1990) supported this report, with a 37,8% and 31,3% prevalence respectively.

Redness on the mucosa or skin that is produced by congestion of the capillaries is better known as *oral erythema or petechiae* and refers to the round, symmetrical, non-raised purplish to reddish spots caused by sub-mucous or intra-dermal hemorrhage as Dorland's (2000) defines it. Gillespie & Mariño (1993) found in 25% of HIV infected Peruvians examined and 5% of the 125 HIV infected Mexicans examined with this condition present. *Petechiae* were found in 1,4% and 1,2% of HIV infected individuals that Tsang & Samaranayaka (1999), and Moniaci et al. (1990) respectively examined.

Kamiru & Naidoo (2002) classified this condition and identified that 27,4% of HIV patients attending the Maseru based hospital, presented with *pseudo-membranous candidiosis*, a higher incidence as opposed to the 12,8% Arendorf et al. (1998) documented. Similarly, in the cases of *erythematous candidiosis*, Kamiru & Naidoo (2002) documented an incidence of 25,6% as oppose to the lower, 15,5% incidence of Arendorf et al. (1998).

Denture stomatitis or *denture sore mouth* as described by Winkler (1994) is a frequent burning sensation occurring in patients who wear dentures continually for long periods and may, occasionally, involve the tongue too. *Denture stomatitis* was identified in 16,53% of South African patients Arendorf et al. (1998) examined as opposed to Margiotta et al. (1999) who identified this condition in 3,8% of Italian HIV-patients examined.

2.6.2 Angular cheilitis

Naidoo (2001) demonstrated in a visual reference document to health workers that *angular cheilitis* related lesions are in most cases tender and slow healing, due to the continuing opening of the mouth. Gillespie & Mariño (1993) documented a prevalence of 55% in a Peruvian study and Tukutuku et al. (1990) 32,5% in Zaire, where both sample groups were HIV positive.

2.6.3 Kaposi's sarcoma

As reported by Jonsson <u>et al.</u> (1998) *Kaposi's sarcoma* was found in 72% of Zimbabwean patients, whereas Gillespie & Mariño (1993) identified the same pathology in 13,3 % of Chilean HIV patients. According to Laskaris (1994) and Clearinghouse (1993) this condition is strongly associated with HIV/AIDS infected patients, and often manifests in the oral environment. Dark-blue, and purple-coloured lesions; plaques and several maculese characterize this extra-oral skin condition. The intra-oral lesions normally develop on the gingival, palate, buccal mucosa, tongue and lips. It is characterized by soft, multiple or solitary ulcerated elevated plaques and brown-reddish tumours.

2.6.4 Oral hairy leukoplakia

Oral hairy leukoplakia is a common condition of the tongue as Gillespie & Mariño (1993) found in 43,2% Mexican HIV-positive patients, whereas Arendorf (1998) and Barone (1990) demonstrated a similar occurrence of 18,6% and 19,7% respectively. Kamiru & Naidoo (2002) identified this condition in 11,9% of the 270 HIV-positive patients examined, very similar to the 11,2% overall average among South African surveys. Laskaris (1994) described this condition, better known as *hairy tongue* or *furred tongue*, which is a asymptomatic condition with unknown causes and several predisposing factors. The colour of the hairy overgrowth may vary from yellowish-white to brown and even black when bacteria colonize the elongated papilla. Clearinghouse (1993) classified this condition as commonly associated with HIV/AIDS-infected patients.

2.6.5 Oral ulceration NOS (not otherwise specified)

Clearinghouse (1993) also classified *oral ulceration* as a commonly associated condition within HIV/AIDS-infected patients. Gillespie & Mariño (1993) documented a prevalence of 30% in a Peruvian HIV patient sample group as opposed to Bernitz & Ligthelm (1998) and Arendorf <u>et al.</u> (1997) who indicated

2% and 2,9% prevalence respectively in HIV-infected patients in South Africa. Whereas, in similar Southern African surveys, Kamiru & Naidoo (2002) indicated a 11,5% prevalence of *oral ulceration* in the Lesotho sample group they examined.

2.6.6 Acute necrotizing ulcerative gingivitis (ANUG)

Acute necrotizing ulcerative gingivitis (ANUG) or trench mouth can be an acute gingival infection characterized by redness, swelling and pain, often accompanied by hemorrhage and a necrotic odour as the Dorland's (2000) describes it. According to Gillespie & Mariño (1993) 24% of the 617 HIV-positive patients examined in Argentina exhibit ANUG, as oppose to the 2,7% of HIV patients in Hong Kong as reported by Tsang & Samaranayaka (1999) and the 2,1% Arendorf et al. (1998) documented.

2.6.7 Gingivitis (not specific to HIV/AIDS)

Gingivitis is an inflammatory disease involving the gingival tissue, and as Laskaris (1994) mentioned, the result of a number of factors of which poor oral hygiene, food accumulation and mouth breathing are the most common. Gillespie & Mariño (1993) found this condition in 21% of American HIV patients and Arendorf et al. (1998) in 1,3% of South African HIV patients examined.

2.6.8 Xerostomia

Xerostomia or dryness of the mouth due to an insufficiency of secretion as described in the Dorland's (2000) is relatively common. Accordingly found by Tsang & Samaranayaka (1999) in 17,8% of 32 ethnic Chinese examined as opposed to Moniaci et al. (1990) who recorded a prevalence of 2,4% in an Italian HIV group.

2.6.9 Herpetic lesions

According to Laskaris (1994) are *herpetic lesions* the result of the herpes simplex virus Type 1 (HSV-1) infection. Focal areas of red mucosa, edematous and several coalescing vesicles develop. Gillespie & Mariño (1993) documented such lesions in HIV populations as follows; 12% in Argentina, 9% in USA, 6,6% in Chilli, 3,0% in Mexico, and 1,1% in Brazil. However, no cases were identified in Peru. Arendorf et al. (1998) have positively identified this condition within 0,5% of HIV South Africans examined as compared to other South African surveys that failed to indicate the presence of any *herpetic related lesions.*

Herpes simplex infection or *Herpes gingivostomititis* was recorded by Margiotta et al. (1999) at a prevalence of 4,8% in an Italian HIV sample, whereas Arendorf et al. (1998) recorded a 0,5% prevalence in a South African HIV group. Herpetic gingivostomititis is an infection of the oral mucosa, including the gingiva, by the herpes simplex virus. The formations of multiple red painful vesicles of about 3-6 mm in diameter often form at the borders of the lips or nares. Laskaris (1994) mentioned that the common cold, exposure to sun or emotional disturbances often precipitate the recurrence of this condition.

2.6.10 Aphthae (aphthous stomatitis)

Aphthae, (aphthous stomatitis) in the mouth presents as small reddish or whitish ulcer-like spots, as briefly described in the Dorland's dictionary (2000) and were evident in 12% of the 83 Zairian HIV-positive patients, Tukutuku et al. (1990) examined. South African surveys failed to indicate the presence of *aphthae.*

Herpetiform aphthous stomatitis manifested in 1,4% of HIV-positive ethnic Chinese Tsang & Samaranayaka (1999) observed. This condition is similar in appearance to the herpes simplex infection.

2.6.11 Leukoplakia

Tukutuku et al. (1990) identified *Leukoplakia* in 8% of Zairian HIV patients whereas Moniaci et al. (1990) and Margiotta et al. (1999) reported 9,9% and 9,6% respectively in independent studies done in Italy with HIV patients as a sample group.

2.6.12 Exfoliative cheilitis

Laskaris (1994) illustrated and described *exfoliative cheilitis* as a chronic inflammation of the vermilion border of the lips and is characterised by the formation of scales and crusts that may be aggravated by hot and cold weather conditions. Exfoliative cheilitis was identified in 7% of the 436 HIV-positive Mexican individuals examined by Ramirez-Amador et al. (1998).

2.6.13 Melanotic hyperpigmentation

Melanotic hyperpigmentation is the abnormal increase in pigmentation of the gingiva or mucosa as defined in the Dorland's (2000). This condition manifested in 6,7% of the 104 Sicilian (Italy) HIV patients Margiotta et al. (1999) examined opposed to the 0,4% of the 737 Turinian (Italy) HIV-referred patients Moniaci et al. (1990) examined. Arendorf et al. (1998) recorded a prevalence of 0,8% among South African HIV patients examined.

2.6.14 Hemangioma

In a South African survey, Bernitz & Ligthelm (1998) found a prevalence of 3,33% of *Hemangioma*, a congenital dilation of localised blood vessels as the Dorland's (2000) describes this condition. Other related South African surveys fail to indicate the presence of *hemangioma* in any other sample group examined.

2.6.15 Oral lichen planus

Laskaris (1998) described *oral lichen planus* as a chronic, inflammatory disease of the oral mucosa and skin, which forms groups of white papules, that usually coalesce to form a network of lines. However, the dental practice patients, not necessarily HIV-infected, examined by Bernitz & Ligthelm (1998) was the only other survey indicating the presence of *oral lichen planus* at 2,67% prevalence. Other related South African oral epidemiological studies fail to indicate the presence of this condition.

2.6.16 Melanotic macules (not specific to HIV/AIDS)

Barone et al. (1990) identified this condition in 2,7% of HIV-positive drug-users, *Melanotic macules*, is a stain or thickening of an area distinguishable by colour from surrounding areas, or a discoloured spot on the skin that is not elevated above the surface, that may turn malignant.

2.6.17 Salivary gland enlargement

Salivary gland enlargement was evident in 2,4% of HIV patients Tukutuku et al. (1990) examined and manifested in 0,8% of South African HIV patients Arendorf et al. (1998) had examined. Similar South African oral epidemiological surveys were unsuccessful in indicating the presence of this condition within other sample groups.

2.6.18 Monomorphic adenoma

Jonsson et al. (1998) identified *monomorphic adenoma,* a benign epithelial tumour in which the cells form distinguishable granular structures in 2% of HIV Zimbabwean patients examined. Other related Southern African surveys fail to indicate the presence of *monomorphic adenoma* in other sample groups.

2.6.19 Squamous cell carcinoma

Tyldesley (1991) described *squamous cell carcinoma* as an aggressive malignant tumour of squamous epithelium. This malignancy was evident in 2% of the HIV-positive Zimbabweans, Jonsson et al. (1998) examined.

2.6.20 Osteomyelitis

Osteomyelitis or inflammation of bone as the Dorland's (2000) describes this condition is due to a pyogenic organism. It may remain localised or spread through the bone, Jonsson et al. (1998) documented a prevalence of 1,2% in the 100 HIV-positive Zimbabweans they examined.

2.6.21 Condyloma acuminatum

Barone et al. (1990) and Margiotta et al. (1999) identified *Condyloma acuminatum* in 1,3% and 1% of HIV-infected patients in their studies respectively, which is statistically similar to HIV (-) subjects. This condition is caused by a virus and occurs on the mucous membrane and skin. According to Dorland's (2000) it is characterised by papillomata, varying in size and form.

2.6.22 Retention cysts

Retention cysts (Kerotocyst) or *Ranula* is a cystic tumour forming beneath the tongue due to blockage and dilation of a mucous gland or sublingual or sub-maxillary duct as Jonsson et al. (1998) found in 1% of all HIV patients they examined which is statistically similar to HIV (-) subjects.

2.6.23 Osteogenic sarcoma

Jonsson et al. (1998) found *Osteogenic sarcoma,* a primary malignant tumour of the bone composed of a malignant connective tissue stroma with evidence of malignant osteoid, bone and or cartilage formation, in 1% of the 100 HIV Zimbabwean patients.

2.6.24 Epithelial tumour

Epithelial tumour is a firm or solid, raised; usually asymptomatic swelling that is larger than 0,5 cm in diameter that occurs on the epithelium. This condition was found in 1% of the HIV patients Jonsson et al. (1998) studied, which is equal in occurrence to HIV (-) subjects.

2.6.25 Non-Hodgkin's lymphoma

Arendorf et al. (1998) identified *Non-Hodgkin's lymphoma* in 0,5% of HIV-positive individuals examined, and Kamiru & Naidoo (2002) identified similar results of 0,7% prevalent in HIV patients attending the Queen Elizabeth II hospital in Lesotho. Laskaris (1998) defined this as a heterogeneous group of neoplastic disorders which originate from lymphocyte cell lines, that present as a soft swelling that may be inflamed, painful and appear reddish and that progresses quickly. Naidoo (2001) stated that this is the second most common malignant condition associated with HIV-infected patients, which corresponds to the Clearinghouse (1993) classification.

2.6.26 Herpes zoster

Bernitz & Ligthelm (1998) demonstrated the oral manifestation of *herpes zoster* in 0,67% of the South African HIV patients viewed and Moniaci et al. (1990) identified a 0,4% presence in the 737 Italian HIV infected patients examined. Herpes zoster is an acute, unilateral inflammatory disease of the peripheral nerves and is caused by the virus of chickenpox occurring on the coetaneous zone supplied by the affected segments and associated with neuralgic pain.

According to the Dorland's medical dictionary (2000), both *Bacterial glossitis;* a superficial inflammation of the tongue and *perioral molluscum contagiosum* cell-like formation of soft tissue around the mouth that are contagious. This condition manifested at equal levels of 0,5% as Barone et al. (1990) documented an American survey where HIV patients were the sample group.

2.7 Summary

This chapter contains a brief summary of the results found in recent oral epidemiological studies indicating the occurrence of oral pathological conditions and normal aberrations in the edentulous sample groups. It also contains prominent oral pathoses manifesting in HIV-infected patients.

Chapter 3 Research design and methodology

3.1 Introduction

In a recent study within the Western Cape of South Africa, Hartshorne (1998) suggests that approximately 9%, which represents about 378 000 people of its population, are edentulous. With this potential demand for the supply of full dentures to edentulous patients that currently exceeds the level of provision, further investigation was necessary.

As a dedicated oral pathological profile has not yet been developed, previous research done on denture-related oral mucosal lesions and temporo-mandibular complaints facilitated a more scientifically orchestrated approach. It is supposed that different constructive advances from dentists and dental technologists can contribute to serving a role in alleviating the denture need. As it also appears that there is no coherence in the approach between dentists and dental technologists to the approach in their supply of full dentures, and highlights, perhaps, a problem much greater than acknowledged by overseeing authorities.

In this empirical investigation, an attempt was made to address the first objective of this study, which is to establish the occurrence of oral mucosal lesion and aberrations in the defined population. This will include the logical basis underlining the sample selection of the dental participants. The design structure, method of data collection, analysis and interpretation will be discussed in this chapter. The following chapter will address statistical arguments and the interpretation of the results obtained.

A sample group of edentulous patients attending the Tygerberg Oral and Dental teaching hospital in the Western Cape in South Africa was included in the survey. An attempt was made to retrieve mainly oral pathological information in the selected edentulous sample group with the purpose of comparison with similar surveys. This prompted the compilation of a schedule or questionnaire to

record the occurrence of normal aberrations; oral pathological conditions, related denture age, and patient information in a group of edentulous persons residing in the Western Cape.

3.2 The archival descriptive research design and methodology

Permission for using this method of research was obtained from the university of Stellenbosch's School of Oral Health. (See appendices A1, A2, A3 and A4) Although, both the University of Stellenbosch (US) and the University of Western Cape (UWC) were approached with regard to the study, UWC refused permission to use their files on the grounds of patient confidentiality.

3.2.1 The edentulous patient population and sample selection

The standard screening procedure is performed by a suitably qualified person that does a preliminary screening of edentulous patients presenting for treatment at academic institutions. Where necessary the patients are referred to the relevant department for any preprosthetic surgery or oral medicine treatment. During the preprosthetic examination, personal details, medical history, including relevant systemic diseases, and dental history, are recorded on a patient folder. This study concerned itself with soft tissue pathology as well as the absence thereof, which presented when the patient received treatment after the initial screening process.

3.2.2 The sample selection

A dental training institution situated in the Cape Metropolitan of the Western Cape of South Africa was used as data source. The Tygerberg Oral and Dental teaching hospital and the University of Stellenbosch granted access to the patients' folders that were required (See appendix A.2 and A.3). According to the agreement of terms with the Oral and Dental teaching unit and the University of Stellenbosch that administered the Oral and Dental teaching unit at the time of the study, all the files had to stay on the premises during the entire data capturing process. Patients were seen on a day-to-day basis and

because files could be needed at any given moment, the data capturing process was thus done on the hospital premises.

The way in which the folders were stored and filed were the main reason for a larger than statistical required sample group. As patients were seen on a day-to-day basis and as the patient was registered, folders were created and numerically filed accordingly, with the result, that the edentulous patient folders were filed with all other dental patients that were in need of other dental-related services.

At the academic hospital, a new patient record and folder system was implemented after 1998. It was decided to exclude dental patients' folders prior to the implementation of the new filing system, to eliminate any bias that this could introduce. An initial selection or sifting of the folders was conducted to identify the edentulous folders to be used in the survey, from all the dental folders. The pilot study schedule was then tested on randomly selected edentulous patient folders.

3.2.3 The pilot study

The necessary permission was obtained from the University of Stellenbosch to perform a pilot study comprising of fifty-nine folders. A pilot schedule document was compiled beforehand according to similar epidemiological questionnaires of which the efficiency and relevancy were tested during the pilot study. The World Health Organization criteria for oral health surveys were used as a guide where possible. The data obtained was tabulated to include the following:

- Patient age,
- Gender,
- Oral pathoses present,
- Denture experience,
- Denture age
- Systemic diseases present.

The pilot schedule sheet was designed to separate, after the folder number was allocated to a random selected number, to ensure patient confidentiality (Appendix A.5). This ensured total confidentiality of patient information.

During the sorting of the folders, it was evident that certain folders contained information regarding the patient denture experience, age of the denture and denture history. The reason why this information was documented was to determine if there was any correlation between the patient's denture experience and the relevant oral pathoses found. The necessary adjustments were made to the pilot schedule document in areas where necessary. The main assumption of this study was, that the eventual US obtained sample size would be sufficient to perform the study, was confirmed after the pilot study was performed.

The effectiveness of the pilot schedule sheet was evaluated after the result of this study was available. An adjustment was made to the schedule sheet to simplify the gathering of data from the patient files. With these adjustments in place, the final survey schedule document was developed.

3.2.4 The final survey schedule sample population, including method of data collection and analysis

The necessary permission was obtained from the Oral and Dental teaching hospital and the University of Stellenbosch to examine 617 patient folders to perform this study. (Appendix A.7). With the same confidentiality measures in place, similarly the final survey was performed using the final survey schedule document, keypunched onto an Excel spreadsheet and transferred to the Education Development Centre of Peninsula Technikon. The final statistical analysis was also carried out using SPSS (Statistical Package for the Social Sciences) version 11.0 Windows.

Chapter 4 Results

4.1 Introduction

Most oral epidemiological studies are performed to reveal the occurrence of oral mucosal lesions and to give an indication of the incidence of specific lesions. The results from these surveys may assist health administrators in the planning of services and the distribution of resources, although most oral lesions are of academic interest.

Dreyer (1978) mentioned that the patients that visit dental hospitals or private dental practitioners are a highly selected group of individuals and therefore associated results do not give any indication as to the true occurrence of conditions in the population at large. He further stated that most oral pathoses are asymptomatic and are disregarded by the patient and practitioner. In cases where malignant transformation of the tissue develops, early detection is of great importance. Comprehensive surveys such as that of Hartshorne (1998), that included the general population, reveal information regarding the overall occurrence of oral mucosal lesions.

Prevalence studies may appear to have a shortcoming in the sense that they could reveal little information of lesions of short duration. However, oral lesions are not always chronic by nature and prevalence studies reveal satisfactory information.

The objective of this part of the study was to establish the occurrence of oral mucosal lesion and aberrations in a defined population. An attempt will be made to discuss and compare the occurrence of the specific edentulous sample group with those studies conducted among South African individuals as discussed in chapter two. Obviously, the most meaningful comparisons would be with previous studies where the sample group comprised of edentulous individuals, but unfortunately, denture-wearing sample groups were the only documented ones.

4.2 Sample analysis

The sample size of this study (617) was similar to the Hartshorne (1993) study. In comparison to international studies, the sample size was larger than that of associate authors. However, the study area is similar to that of Dreyer (1978) and Watermeyer (1979) as table 4-1 indicates. All the sample sizes compared favourably to that of the associated international researchers as indicated in table 4-2, but were smaller than the current study.

Table 4-1. Comparison of studies containing edentulous patients in the Western Cape

Researcher	Study area	Denture-wearing sample size	Gender ratio M/F overall	Age distribution
Dreyer (1978)	Cape Metro	340	107/233 (1:2.17)	20—34 35—49 50—64 >65
Watermeyer (1979)	Cape Metro	453	99/411 (1:4.15)	54—69 70—79 80—89 >90
Hartshorne (1998)	Western Cape South Africa	612	839/948 (1:1.13)	20—34 35—49 50—64 65—79 >80
Present study (2002)	Western Cape academic hospital	617	195/422 (1:2.16)	21—40 41—60 61—80 >81

Table 4-2. Comparison of international studies containing edentulous patients

Researcher	Study area	Denture-wearing sample size	Gender ratio M/F overall	Age distribution
Jorge et al. (1990)	Piracicaba Brazil	113	134/136 (1:1.01)	<54 55—64 65—74 75—84 >85
Tobias & Smith (1989)	London UK	107	30/70 (1:2.33)	60—74 75—84 >85
Moskona & Kaplan (1992)	Israel	187	94/204 (1:2.17)	66—69 70—79 80—89 90—99
Corbet et al. (1994)	Hong Kong	284	- -	65—74
Nevalainen et al. (1997)	Helsinki Finland	66	102/262 (1:2.57)	>76 >81 >86
Present study (2002)	Western Cape academic hospital	617	195/422 (1:2.16)	21—40 41—60 61—80 >81

4.3 Gender analysis

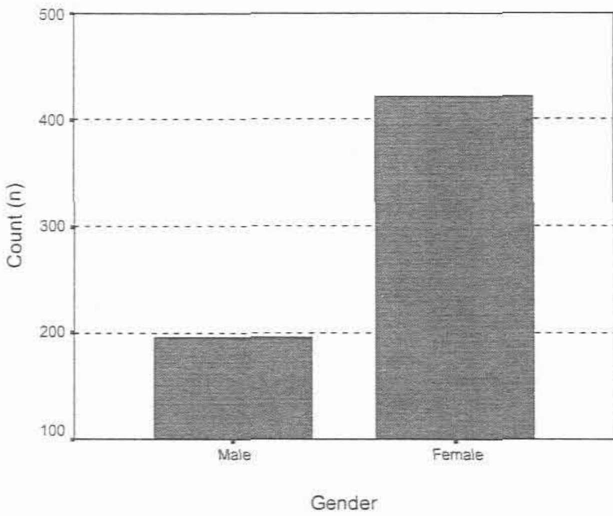

Figure 4-1. Gender ratio

The sample size added up to 617 edentulous subjects, of which 31,6% were male and 68,4% were female as figure 4-1 indicates, creating a gender ratio of 1:2.16 (male: female) similarly to the gender ratio result of 1:2.17, Dreyer (1978) documented. The gender ratio within the current study is similar to the 1:2.16 of Moskona & Kaplan (1992), and the 1:2.33 of Tobias & Smith (1989).

4.4 Age frequency

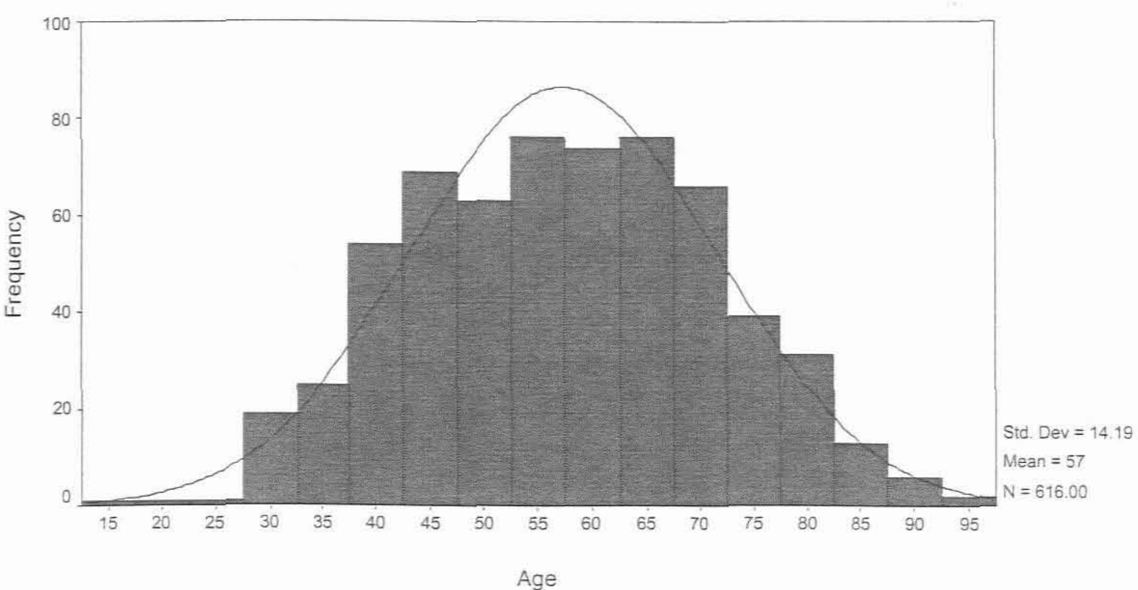

Figure 4-2. Age distributions

The mean age of the sample group was 57,3 years of age. The youngest edentulous patient was a 17-year-old male and the oldest was a 97-year-old female. The skewness value indicates a distribution that does not differ significantly from a normal or symmetric distribution. An even age distribution was evident in the above age frequency graph (figure 4-2). The average age of males in this sample group was 58 years of age and females 57 years of age.

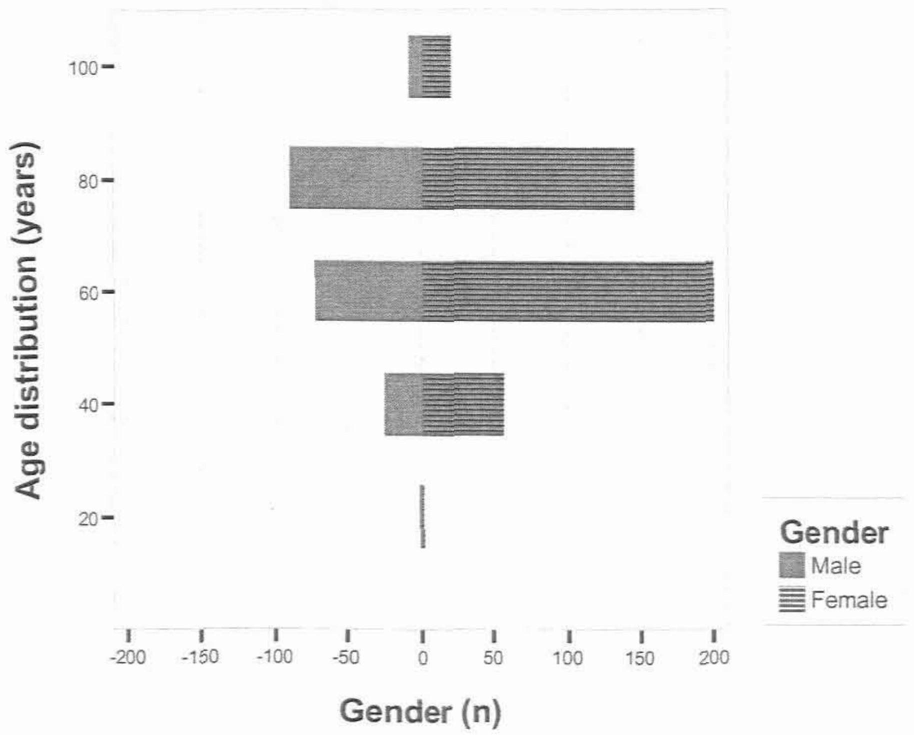

Figure 4-3. Age and gender distribution

The smallest age category was between 1-20 years representing only 0,2% of the total sample population. The 21-40 age group, represented 13,1% of the total sample size. The two largest age groups were the 41-60 years and the 61-80 year old group at 43,8% and 38,1% respectively. The 81-100 year age group made up 4,7% as figure 4-3 above indicates. The age categories were found to be different in each comparable study.

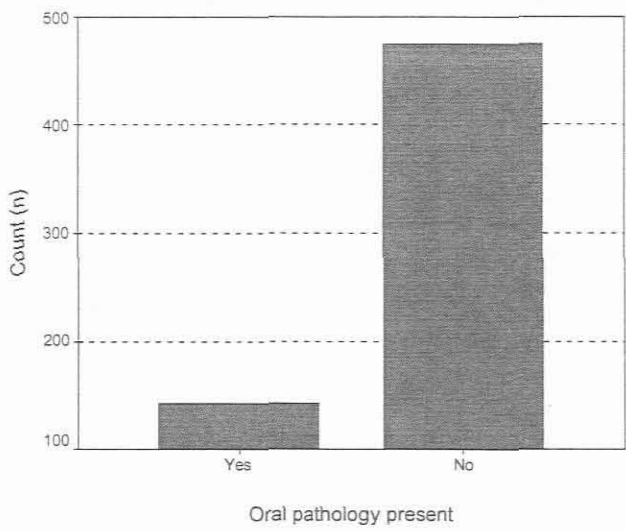

Figure 4-4. Occurrence of normal edentulous oral tissue conditions

Figure 4-4 indicates a total number of 483 edentulous denture-wearing patients were found without any oral pathological lesions, representing 78% of the total sample group. With the majority of these patients, the process of denture treatment started as normal. The percentage of healthy individuals in the current study differ considerably with a previous study Watermeyer (1979) performed, where 26,4% of the sample group that consisted of elderly white institutionalised individuals were healthy. Although our figure is lower than the 83,3% of Hartshorne (1998), it supports the findings that the majority of denture wearers in the Western Cape do not exhibit such conditions. Dreyer (1978) identified a lower percentage of healthy individuals (59%) reasoning that although a high proportion of the Cape Malay are denture wearers, a relatively low occurrence of denture-related lesions existed.

The present study also corresponds to the findings of Taiyeb Ali et al. (1995), of 77,2%. When compared with international studies, a marked variation is found: Jorge et al. (1991), Moskona & Kaplan (1992), Cumming et al. (1990) and Garcia-Polo Vallejo (2002) observed that 41%, 41,8%, 46% and 48,9% respectively are healthy; significantly different from the present findings. Tobias & Smith (1988) however, identified that 96,3% of patients were healthy denture wearers as table A-13 indicates.

4.5 The presence of normal aberrations and two hereditary conditions

The number of *normal aberration* cases added up to thirty-four (8,6%). These aberrations are listed in order of prevalence according to statistical analysis. In most of the studies reported, normal aberrations were not documented as a separate entity. Similar studies within the literature failed to report on the overall occurrence of normal aberrations as a single entity. The specific aberration, if present, was listed, in all cases, as part of the main list of oral soft tissue conditions found.

4.5.1 Mobile alveolar ridge (Flabby ridge)

Mobile alveolar ridge prevailed in 2,6% of our sample group. This condition was present in a total number of 16 subjects. About the same number of males (7 cases) and females (9 cases) was found with mobile alveolar ridge; a prevalence of 3,6% and 2,1% percent respectively among genders. The difference appeared to be significant and the conditions apparently showed an increase with age in both males and females. The chi-value of 1,121 (df. =1, p=0,290) was calculated, indicating, no significant difference when tested by the Pearson chi square method. The occurrence also failed to reveal a trend with age for both males and females. Computed only for a 2x2 table.

4.5.2 Oral mucosal pigmentation

Oral mucosal pigmentation formed a subdivision of twelve healthy individuals (1,9%) of whom five were male and seven female. In all these cases denture provision proceeded as normal. It was not possible to tell from the information documented on the folder what colour or race the patient represented. No direct assumption could be made in the particular study that the patients who presented with oral pigmentation were dark-skinned or coloured. Oral mucosal pigmentation is a common condition, but the literature does not specifically indicate the occurrence within *edentulous* groups.

4.5.3 Chronic cheek chewing (Morsicatio buccarum)

The presence of mild chronic biting of the oral mucosa commonly known as *chronic cheek chewing/biting* was found in six edentulous patients (1%). Three females and three males exhibited this condition, that can be related to a stressful living environment or it might be that these patients are anxious and stressed individuals by nature. Although these conditions are commonly found in the buccal areas according to Scully (1999), other edentulous sample group surveys failed to report the occurrence of this condition.

4.5.4 Tori

Torus mandibularis is an exostosis, such osseous overgrowths in the mandible were found in three female individuals (0,5%) of the total edentulous sample group in the Western Cape. *Torus palatinus,* a developmental malformation situated in the maxillary palate was documented in at least three cases (0,7%) of the 617 folders sifted. One patient that presented a condition associated with torus palatinus, terminated denture provision, and did not receive dentures. Other edentulous sample group studies failed to report the occurrence of this condition.

The results from this current study supported the findings of Scully (1999), Neville et al. (1995), and Laskaris (1994) that Tori-related findings were more prevalent in females than in males.

4.5.5 Geographic tongue

Geographic tongue was identified in three edentulous individuals that results in a prevalence of 0,5%. Although records exist where geographic tongue was found within a geriatric sample group, no record was found with similar edentulous sample group surveys.

In the conditions to be discussed, no difference in occurrence between males and females could be described. This was not possible due to the small group.

4.5.6 Sublingual varicosity

Two edentulous patients, one male and one female, in the current study showed signs of *sublingual varicosity*, a prevalence of 0,3%, whereas Nevalainen, Närhi & Ainamo (1997) found 4% of their sample group had developed *sublingual varicosities*.

4.5.7 Active frenum

Active frenums were found within two individuals (0,3%), one male and one female. Other surveys failed to indicate the presence of this condition.

4.5.8 Macroglossia

Macroglossia was present within one female patient representing 0,2 % of the total sample group. Other researchers failed to indicate the presence of *macroglossia* in their sample groups.

4.5.9 Cleft palate

In the whole sample group, orofacial deformity in the form of a *cleft palate* was identified in one female patient. Although one of the most common congenital craniofacial abnormalities according to literature, no other comparable results could be found within a denture-wearing sample group.

4.5.10 Fissured tongue

Several fissures and grooves on the dorsal surface of the tongue resemble *fissured tongue* and were found within one female individual in the edentulous sample group. Neville et al. (1995) mentioned that a strong association exists between fissured tongue and geographic tongue, but other survey results failed to indicate the presence of this tongue condition.

4.5.11 Pneumatisation of the maxillary antrum

Pneumatisation of the maxillary antrum is an enlarged maxillary antrum with a thin bony floor. It was evident in one female edentulous patient. No other comparable results could be found within the literature.

4.5.12 Cavernous haemangioma

The enlarged diameter of the proliferating blood vessel is synonymous with *cavernous hemangioma.* According to Neville et al. (1995), clinical features similar to capillary hemangioma include a predilection for females, as was found within the present study where the only affected patient representing 0,2% of the total sample group was a fifty-year-old female. The literature failed to indicate the presence of cavernous hemangioma in other similar surveys.

4.5.13 Exposed mental foramen

Exposed mental foramen due to the resorbtion of the alveolar ridge was identified in one female individual. No other comparable results could be found within a denture-wearing sample group.

4.6 The presence of oral lesions

Table 4-3. Number of oral lesions identified according to gender

Gender	Number of lesions	Frequency (n)	Percentage (%)
Male	No lesions	147	75,5
	One lesion	39	20
	Two lesions	9	4,6
Female	No lesions	347	82,2
	One lesion	58	13,7
	Two lesions	16	3,8
	Four lesions	1	0,2

A total number of 134 (22%) lesions were identified. In the majority of patients identified with oral pathoses present, 15,7% demonstrated at least one oral lesion as table 4-3 indicates. In 4,1 % of the total population, two identifiable oral pathoses were detected per patient. In a single patient, four oral lesions were identified. In this particular case *denture stomatitis, angular cheilitis, denture-related hyperplasia* and *mobile alveolar ridge* were identified.

The 22% prevalence of lesions found within the population is lower than the combined 35,7% average of the associated denture wearer surveys previously performed. Hartshorne (1998) documented an incidence of 14,3% in a previous South African survey performed in the Western Cape.

Other studies revealed a much higher occurrence as Jorge et al. (1990), Moskona & Kaplan (1992), Cumming et al. (1990) indicated with 58%, 58,2% and 54% respectively of all patients examined, exhibited at least one oral pathoses. Nevalainen, Närhi & Ainamo (1997) and Corbet et al. (1994) identified 37,9% and 40% respectively, of patients examined, to have some sort of oral pathoses present; a moderate difference compared to the current findings. Kuc et al. (1990) and Tobias & Smith (1989) documented a prevalence of 12% and 3,7% respectively; lower than the average and lower than the current percentage. The current result is strikingly similar to the result found within a geriatric Malaysian denture-wearing group examined by Taiyeb Ali et al. (1995) at a prevalence of 22,8%.

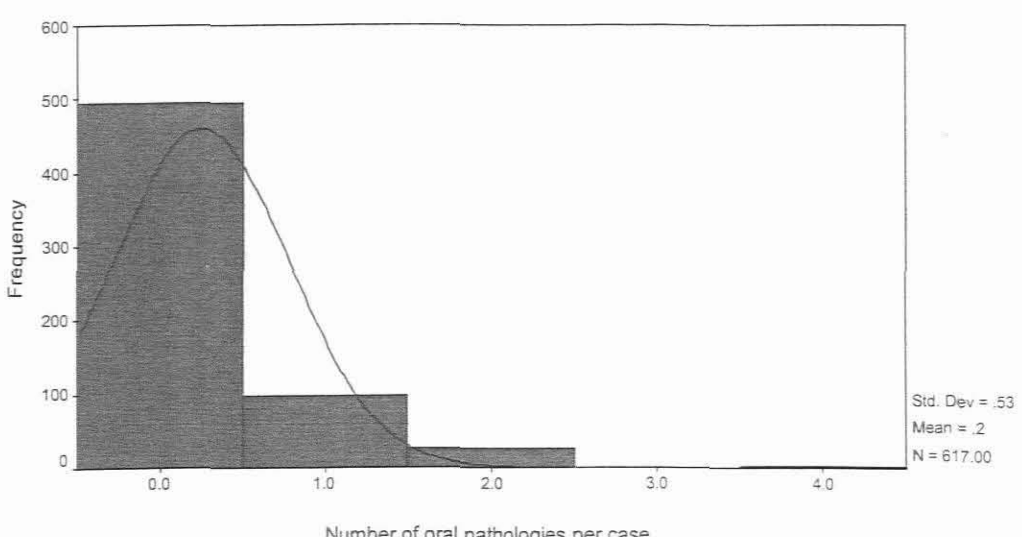

Figure 4-5. Number of oral pathoses present per case

The 25,1% prevalence of oral pathoses in males was slightly higher than the 20% in females. A Pearson chi-square test was used to test the significance of the occurrence of oral pathoses in males and the occurrence within females. A chi-value of 0,719 (df. =1, p=0,397) was computed; this indicated that there was no significant difference between the occurrence of oral pathoses within males and females respectively. However, calculations indicated it was evident that males might have a higher probability of having oral pathological problem present than females.

The results indicated that the 41-60-age category was found to be most affected by some sort of oral pathoses at a prevalence of 44,5%. The 61-80-age category was the second largest with similar results of 42,3% incidence. The two groups the least affected were the younger age groups; younger than 20 years of age and the category between 21 and 40 years of age.

Most published studies have failed to indicate accurate prevalence according to gender. Oral pathological conditions found during the search were listed in order of prevalence, from most prominent to least. All lesions found correspond to those described by Budtz-Jørgensen (1981), and can be associated with the wearing of removable dentures. Caution was taken to compare only similar results where the sample was restricted to edentulous patients. Tooth-related conditions were not compared due to the edentulous subject compilation of the present sample group.

4.6.1 Denture stomatitis

Denture stomatitis was present in 43 (7%) of the total sample population of 617 edentulous individuals. If denture stomatitis is seen in the context of the rest of the oral pathoses found, it was calculated that it made up 28,9% of the total cases with oral pathoses present. Of the 43 affected individuals, 15 were males and 28 were females, which is a prevalence of 7,7% and 6,6% percent respectively. A Pearson chi-value of 0,23 (df. =1, p=0,632) was calculated, indicating no significant difference in the occurrence of denture stomatitis within males and females.

The results from this study did not support the 28,5% prevalence of denture stomatitis findings Dreyer (1978) identified. The occurrence of a disease is normally expressed as a ratio of the total sample affected. In the case of a condition such as denture stomatitis these figures may be misleading. According to Dreyer (1978) and Budtz-Jørgensen (1978 & 1981), denture stomatitis is associated with dentures and the pattern of denture wearing may influence the pattern of the disease. A linear trend was demonstrated in the present sample between denture-wearing and age. The current results confirm the Hartshorne (1998) findings that denture stomatitis is the most prominent oral pathological condition at 16,53% found in denture-wearing patients and is highly associated with the wearing of dentures.

The occurrence of denture stomatitis in the current study however, compares favourably with the results from a Chinese population examined by Corbet, Holmgren & Philipsen (1994) and in a Canadian denture-wearing group, Kuc et al. (1990) examined, who documented a prevalence of 10% and 11,5% respectively. Garcia-Polo Vallejo (2002) observed a prevalence of 30,1% in an adult Spanish population, Dorey et al. (1985) 26% in a Canadian denture-wearing population.

4.6.1.1 Sub-divisions of denture stomatitis

The folders failed to consistently indicate clinical sub-divisions of denture stomatitis at the time of examination, according to Newton (1962) and as result listed as a single condition or as a lesion found.

4.6.1.2 Pinpoint hyperaemia

The occurrence of *pinpoint hyperaemia* in the current study differs strongly from the results of Hartshorne (1998), and Dreyer (1978) that identified a 23% and 25,9% prevalence respectively. Dorey et al. (1995) however documented an incidence of 4% among the 200 Canadian denture-wearing individuals.

4.6.1.3 Diffuse erythema

Diffuse erythema, because of trauma and candidal infection was continuously mentioned in the folders. The current study failed to identify this sub-division in patients with denture stomatitis, if compared to the 50% prevalence identified by Hartshorne (1998) in a sample group containing 612 denture-wearing individuals, no correspondence was evident.

4.6.1.4 Granular hyperaemia or papillary hyperaemia

Granular hyperaemia was present in 0,6% of the total sample group. These results differ significantly from the 27% of Hartshorne (1998) but, if compared to the 2,6% prevalence Dreyer (1978) documented, it is found to differ little.

4.6.2 Ulcerations and related lesions

Incidence of *ulcerations and related lesions* among edentulous patients attending the academic hospital are 5,2% and 21,1% of the total cluster of oral pathoses. The occurrence, according to gender, indicated that males (6,2%) are more prone to develop denture-related ulcers than females (4,7%) in this sample group, which is in disagrees with the findings of Dreyer (1978), which indicated the opposite. In his particular sample group, consisting of Cape Malay, 1,9% of the males and 3% of the female subjects exhibited *denture-related lesions* with no significant difference. Our study revealed a Pearson chi-value of 0,461 (df. =1, p=0,543), these figures indicated that there was no significant difference in the occurrence of denture-related lesions between males and females and was computed only for a 2x2 table. It might be argued that dentures are worn past the ideal life span of five years. Regular clinical examinations are of great importance, whereas geriatrics is inclined to wear dentures until they suffer discomfort and irritation, which is when the underlying tissues often become traumatized and in some cases damaged.

4.6.3 White lesions

White lesions were evident in 27 cases (4,4%) examined. The cases of white lesions found were nine males and eighteen females. White lesions made up 19% of all oral pathoses found. . The 4,4 % prevalence accumulated from the patient folders was similar to the 4,3% Taiyeb Ali et al. (1995) documented for a Malaysian sample group that consisted of 139 edentulous. No significant difference was found in the prevalence between genders. Computed only for a 2x2 table, a chi-value of 0,39 (df. =1, p=0,843) was calculated.

4.6.4 Denture-related hyperplasia

Denture-related hyperplasia was recorded at a percentage of 1,9% from our sample group that consisted of patients between the ages of 17 and 97. The prevalence, according to gender, indicated that males (2,6%) were more prone to develop denture-related ulcers than females (1,7%). No significant difference in the occurrence of denture-related hyperplasia between males and females was evident as a chi-value of 0,573 (df. =1, p=0,449) indicated and only computed for a 2x2 table.

4.6.5 Angular cheilitis

Angular cheilitis was identified in eleven individuals (1,8%) and made up 6,6% of the total oral pathoses identified. The 3,1% prevalence of angular cheilitis within males was more than double than identified within females (1,2%) although almost the same number of cases was affected within each gender. According to the Pearson calculated chi-value of 2,727 (df. =1, p=0,099), there was no significant difference in the occurrence of angular stomatitis within males and females.

In the oral pathoses discussed from here on, no difference between males and females could be demonstrated. From this it appears that the occurrence of these conditions increased with age although this could not be tested due to the small sample size.

4.6.6 Median rhomboid glossitis

Median rhomboid glossitis was present in two females (0,5%). This, normally asymptomatic, condition is a depapillation rhomboidal area in the centre line of the dorsum of the tongue. According to Scully (1999), this condition may have a relationship with candida albicans and diabetes mellitus. The current results are 17 percentage points lower than the comparable group average of 40%, but similar to the findings of Taiyeb Ali et al. (1995) of 22,8% in a sample group. According to the Pearson chi-value of 0,927 (df. =1, p=0,336) that was calculated from our results, these figures indicated that there was no significant difference in the occurrence of median rhomboid glossitis within males and females. Computed only for a 2x2 table, two cells (50,0%) have an expected count less than 5 where the minimum expected count was 0,63.

4.6.7 Ranula

Ranula described by Neville et al. (1995); is a term that refers to the mucoceles that form on the floor of the mouth. It represents as a blue, dome-shaped, swelling that may develop into a large mass. A ranula was identified in one female edentulous patient. A chi-value of 0,23 (df. =1, p=0,632) indicated no significant difference in the occurrence of ranula within males and females. The minimum expected count was 0,32 and computed for a 2x2 table, 2 cells (50,0%) have an expected count less than 5.

4.6.8 Cemento-osseous dysplasias

In one patient folder *cemento-osseous dysplasias* was confirmed by a laboratory report from the academic hospital. A single female was affected with this associated condition. A Pearson chi-value of 0,463 (df. =1, p=0,496) was calculated, indicating no significant difference in the occurrence of cemento-osseous dysplasias within males and females. Computed only for a 2x2 table, 2 cells (50,0%) have an expected count less than 5. The minimum expected count is 0,32.

4.6.9 Hemangioma

One female exhibited a *hemangioma; according* to Neville et al. (1995) this benign proliferation of blood vessels represents a hamartoma or malformation rather than a true neoplasm. No significant difference in the occurrence of hemangioma within males and females was calculated with chi-value of 0,463 (df. =1, p=0,496). Computed only for a 2x2 table where 2 cells (50,0%) have an expected count less than 5. The minimum expected count is 0,32.

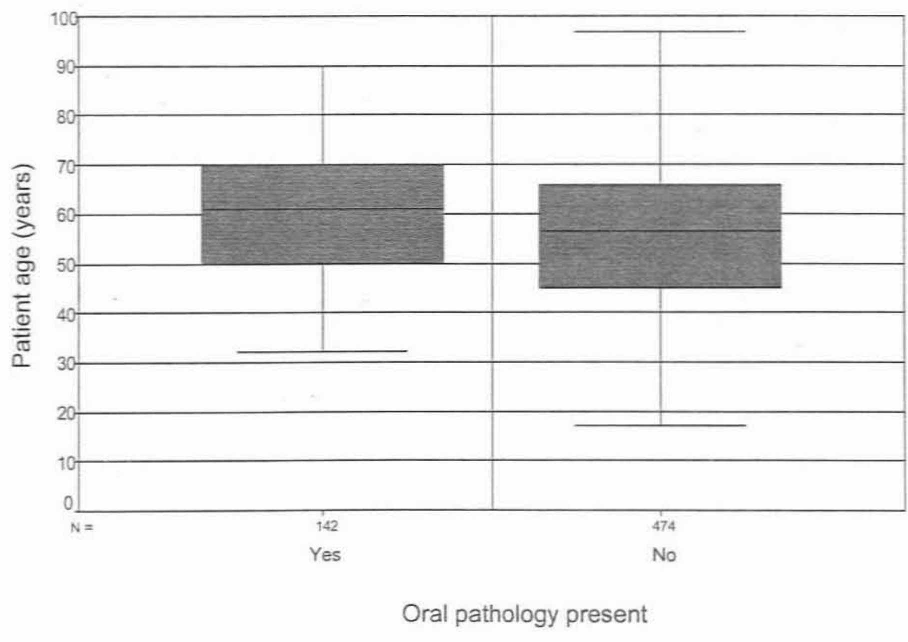

Figure 4-6. **Oral pathoses related to patient age**

Figure 4-6 indicates that the presence of oral pathoses in denture wearers older that the age 60 is greater than their younger counterparts. The average age at which individuals in the sample group exhibit some sort of oral pathoses is approximately at 58 years of age.

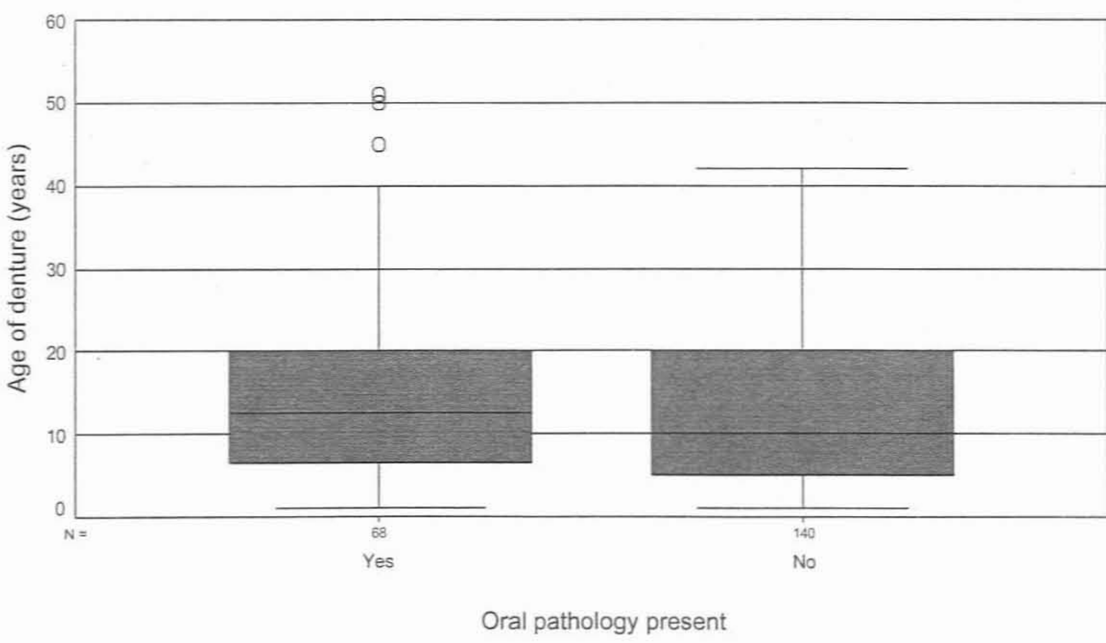

Figure 4-7. Oral pathoses related to denture age

Figure 4-7 indicates that an insignificant trend exists in the present sample group between dentures received and the age of the denture. From the analysis, it was evident that more females received dentures at an earlier stage than males. Individuals that exhibited oral pathoses were found to be wearing older dentures than individuals who replace their dentures more regularly. A linear trend existed in the present sample between dentures received and patient age. From the result it was evident that the age of denture worn by women are older that that of their male counterparts.

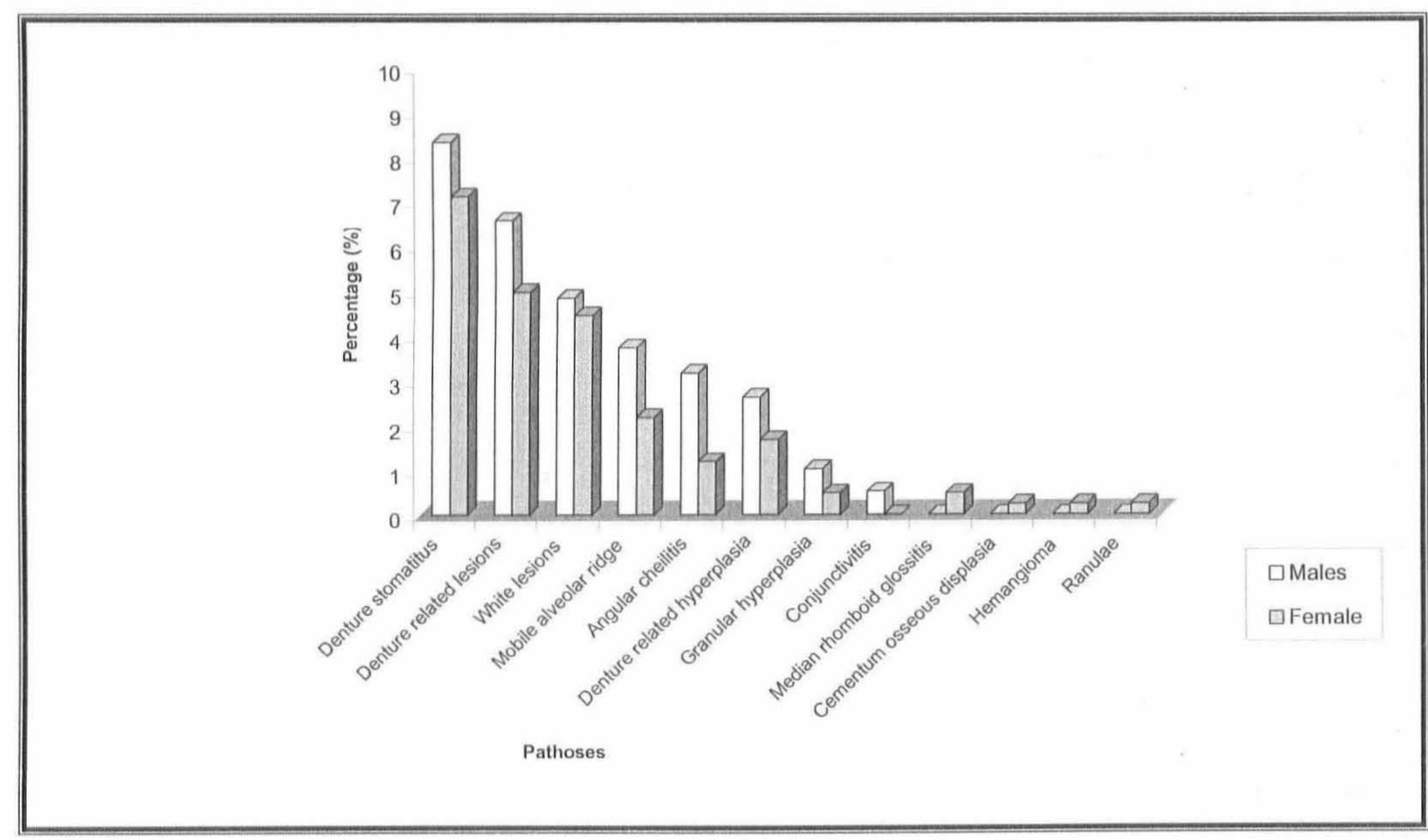

Figure 4-8. **Percentages of pathoses present**

4.7 Denture experience analysis

During the sorting of the folders, it was evident that several folders contained information regarding the patient denture experience, age of the denture and denture history. The reason this information was documented was to determine any correlation between the patient denture experience and the relevant oral pathoses mentioned.

Table 4-4. Denture experience of the sample group

Valid set	Frequency (n)	Percentage (%)
First denture	29	4,7
Third denture	24	3,9
Fourth denture	2	0,3
Fifth denture	2	0,3
Seventh denture	1	0,2
Fourteenth denture	1	0,2

There were 400 (64,8%) folders that contained denture experience-related information. Twenty-nine individuals (4,7%) of the total sample group received dentures for the first time. A similar 3,9% was identified in the group that would be receiving their third set of dentures. A 68-year-old male indicated that he was to receive his fourteenth set of dentures. Another male, 73 years of age indicated that he was to receive a seventh set of dentures.

4.8 Denture age

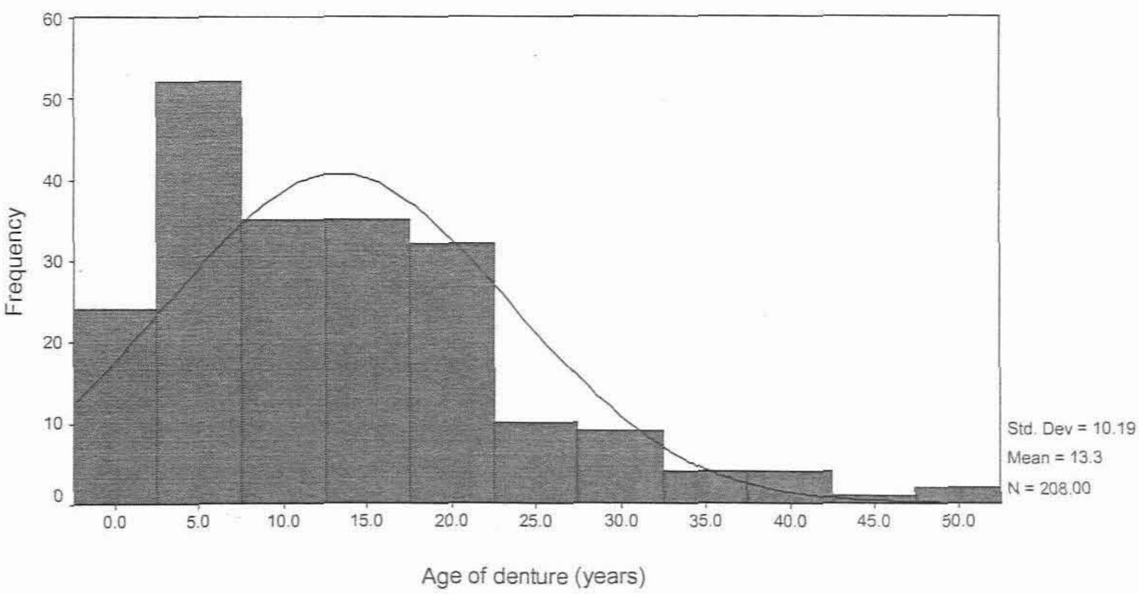

Figure 4-9. Denture age distribution

Denture age was documented in 208 folders, (33,7%) of cases. The mean age of all the dentures was 13,3 years. The mean age of dentures in male patients was 11,6 years and in females 13,6 years old. The oldest denture was that of a female patient who was 51 years old. The largest percentage of dentures was between the age of five and twenty years. This may be a reflection of economic conditions where dentures are worn beyond their ideal life span of 5 years. Watermeyer (1979) indicated that the mean age of dentures in use were 22 years, an age that meant that most dentures were ill fitting. A decrease in the mean age of dentures may be due to the availability of health services that have developed over the past decades and the differences in geographic backgrounds of the two sample groups.

4.9 Denture-wearing habits

No information was found in the folders regarding denture-wearing habits.

4.10 Systemic diseases mentioned

A total number of 236 folders (38,2%) were identified that contained information regarding patients with systemic conditions.

4.10.1 Hypertension

Hypertension was documented in 140 cases; at 22,7%; it represented the largest percentage of all systemic diseases found.

4.10.2 Cardiac-related disorders

Cardiac-related disorders were demonstrated in 41 (6,6%) individuals. This was the second most prevalent systemic disease in the sample group.

4.10.3 Diabetes mellitus

Diabetes mellitus was recognized in 40 individuals (6,5%), the third largest subset of systemic disease found.

4.10.4 Asthma

Asthma was an evident systemic disease in 27 individuals (4,4%).

4.10.5 Allergy

Twenty-five, (4,1%) edentulous patients indicated that they had an *allergy* of some sort.

4.10.6 Rheumatic fever

The prevalence of subjects who had contracted *rheumatic fever* was 2,1%, a total of thirteen affected with systemic diseases.

4.10.7 Bleeding tendency

Thirteen of the subjects had a *bleeding tendency* with a similar prevalence of 2,1%.

4.10.8 Epileptic episodes

Epileptic episodes were found to be a systemic disease in eleven cases examined at a prevalence of 1,8%.

4.10.9 Blood dyscrasias

Two patients (0,3%) had *blood dyscrasias*.

4.10.10 Arthritis

Two patients (0,3%) were found to have *arthritis*.

4.10.11 Emphysema

Emphysema was another systemic disease, with a similar prevalence of 0,2%, in one individual.

4.11 Medical problems and medication used by patients

4.11.1 Penicillin allergy

38 Patients (6,2%) indicated that they had a *penicillin-related allergy*.

4.11.2 Morphine allergy

Two patients (0,3%) had a *morphine allergy*.

4.11.3 Hormone replacement therapy

Twelve female patients (1,9%) took some form of *hormone replacement therapy*.

4.11.4 Corticosteroid treatment

Seven individuals of the total sample group received *corticosteroid treatment* that constituted to 1,1% of the total sample size.

4.11.5 Mentally disabled

One patient (0,2%) from the sample group was *mentally disabled*.

4.12 Summary

This chapter elaborated on the statistical occurrence of normal aberrations, oral pathoses and systemic diseases identified within an edentulous group. It was determined that approximately three quarters of all edentulous patients seeking complete dentures from the local dental training hospital were healthy, without any oral mucosal lesions or developmental conditions or malformalities. A discussion followed where the current results were compared to similar surveys. The relation between the denture age, patient age and pathoses present was discussed.

Chapter 5 Discussing the implications of an oral pathological profile in an extended concept of dental community service.

5.1 Introduction

The study so far has attempted to classify the possible components of an oral pathological profile. Its use, however, from a technikon perspective, would be in the cycle of events that may lead to the expanded benefit of the edentulous patient. To understand the proposal in this sense, this chapter will first establish the current roles and responsibilities of the dentist and dental technologist in terms of the edentulous patient, followed by a possible concept of dental community service to the edentulous. Finally, some recommendations are made with regard to additional educational needs of the dental technologist in order to assist such a transformation.

5.2 An understanding of the current relationship between dentist and dental technologist with regard to edentulous patients

A superficial comparison of the dentistry degree and the dental technology degree yields the following information:

5.2.1 University Degree in Dentistry (B.ChD.)

(a) Admission requirements:

- Matriculation Exemption or Endorsement.
- An aggregate of at least 70%.
- Mathematics and Physical Science HG: D or SG: C.
- Biology or Physiology for Grade 12 is strongly recommended.

The purpose of this programme is to train dentists who will have the knowledge, skills and attitudes to function independently in the health sector as a whole, but also as team members where appropriate preventative, therapeutic and rehabilitative health services are required in the community. The programme spans five and a half years, followed by a year of community service and registration with the Medical and Dental Professional Board (of the Health Professions Council of South Africa).

(b) First year modules:

Biology
Chemistry
Physics
Data management
Introduction to Medical Science
Cells and tissues
Haematology and Immunology
The bases of disease processes and infections
Principles of therapy

(c) Second year modules:

Neurosciences
Musculoskeletal system
Cardiovascular system
Respiratory system
Urogenital system
Gastro-intestinal system
Endocrine system
Behavioural science and ethics
Introduction to clinical medicine
Cardiovascular system
Respiratory system
Head and neck anatomy
Oral biology
Internal medicine
Chemical pathology
Surgery
Orientation to dentistry

(d) Third year modules:

Introduction to conservative dentistry
Introduction to removable prosthodontics
Introduction to maxillo-facial radiology
Anaesthesiology
Introduction to maxillo-facial and oral surgery
Introduction to preventive dentistry
Behavioural sciences
Epidemiology and community project
Dental materials
Introduction to maxillo-facial and oral pathology

(e) Fourth year modules:

Integrated module on oral diseases
Maxillo-facial radiology
General surgery
Community dentistry
Behavioural sciences
Maxillo-facial and oral surgery
Anaesthesiology
Internal medicine
Clinical dentistry
Chemical pathology
Orthodontics

(f) Fifth year modules:

Maxillo-facial and oral surgery
Community dentistry
Integrated module on oral diseases
Clinical dentistry
Paediatric dentistry
Orthodontics

(g) Sixth year modules:

Clinical dentistry
Professional ethics and jurisprudence
Dental practice management

5.2.2 Technikon National Diploma: Dental Technology (N Dip. Dental Tech.)

(a) Admission Requirements:

- Senior Certificate with Mathematics and/or Physical Science.
- Successful completion of an aptitude and manual dexterity test.

On completion of the diploma course, graduates will be able to register as dental technicians with the South African Dental Technicians Council. Dental technicians are able to work in a registered dental laboratory under supervision of a dental technologist (see 5.2.3) or dentist.

(b) First-year subjects:

Dental Technology Theory I
Applied Dental Technology I
Dental Materials Science I
Oral Anatomy I
Tooth Morphology I
Communication I

(c) Second-year subjects:

Dental Technology Theory II
Applied Dental Technology II
Dental Materials Science II
Jurisprudence I

(d) Third-year subjects:

Dental Technology Theory III
Applied Dental Technology III
Dental Materials Science III
Business Practice I

5.2.3 Technikon Bachelor's Degree in Dental Technology (B. Tech. Dental Tech.)

(a) Admission Requirements:

- National Diploma: Dental Technology (N Dip. Dental Tech.)

Upon completion of the course, graduates will be able to register with the South African Dental Technicians Council as dental technologists and will able to own a dental laboratory. The dental technologist owning a laboratory may employ other dental technologists or dental technicians to work under his or her supervision. With the successful completion of the B.Tech. Dental Technology degree, further study in this field is possible.

(b) Subjects:

Dental Technology IV
Dental Material Science IV
Business Practice II
Research Methods and Techniques I

5.2.4 Discussion of current dental qualifications

The above information indicates the dentist and dental technologist to have clearly differentiated roles and responsibilities with respect to their areas of expertise and application. The dentist is educated to interact with the patient, to understand the cause and diagnosis of the patient's needs, and to prescribe and administer remedial action. The dental technologist provides a service to the dentist, in line with such prescribed needs for customised fixed and removable prosthesis.

The dental technologist makes a wide range of dental appliances including crowns, bridges, orthodontic appliances and dentures, working to the prescription of the dentist for each patient. The dental technologist that qualifies after 4 years of fulltime study is competent in the following fields of dental technology:

- Orthodontic appliances

  Acrylic or metal appliances designed by the dental technologist, to the dentist's written prescription which are used to re-align teeth in a pleasing and functional arrangement.

- Fixed crown, bridge and implant appliances

  The manufacture of crowns and bridges, for restorative dental work, is a skilled task and requires experience and precision. A wide range of materials can be used, including metal alloys and gold, which is used in some types of crown, or porcelain, which is used for the majority of crowns.

❖ Removable prosthetic appliances

This includes the production of dentures. These can be made either of a plastic material, or of a metal, such as chrome cobalt. The technologist is responsible for the production of the initial set of teeth, which is usually done in wax to allow the teeth to be re-arranged as necessary. The production of a denture may take up to seven stages within the dental laboratory.

A dental technologist can choose to produce a wide variety of technical items or to limit his or her work to one of the individual areas above. Without the help of a dental technologist, dentists would not be able to offer the full range of services to their patients. The dentist relies heavily on the dental technologist. The dental technologist works to a written prescription, but rarely meets the patient for whom he or she is ultimately working. A high degree of technical skill, manual and some artistic flair and dexterity is essential.

The majority of dental technologists are employed in commercial dental laboratories, but can also be employed within dental hospitals and the armed forces. Commercial dental laboratories range from single-handed businesses, to large multi-site laboratories offering a comprehensive service. Dental technologists usually produce work for a number of local practitioners. Some commercial laboratories offer a postal service, dealing with dentists from a wide area. If a technologist works within a dental hospital, it is usually in conjunction with the *maxillofacial* department. This may involve the making of complex prostheses including eyes, nose and ears. If employed in a hospital, a dental technologist may become involved in research, or may teach undergraduates some of the technical aspects of dentistry.

These individuals construct, reline, rebase, and repair complete, partial and immediate removable dentures, where the customers are mainly dentists. They are also competent in the technical and manufacturing aspects of all the different fields stated above. A dental technologist does not collect patient information, dental history, and does not perform intra and extra oral examinations. The contact between the dental technologist and patient is limited and mainly entails shade determination in certain instances.

5.3 Current dental roles and responsibilities with regard to edentulous patients

The current process of interaction between dentists and dental technologists for edentulous patients may be summarised as in figure 5.1 below:

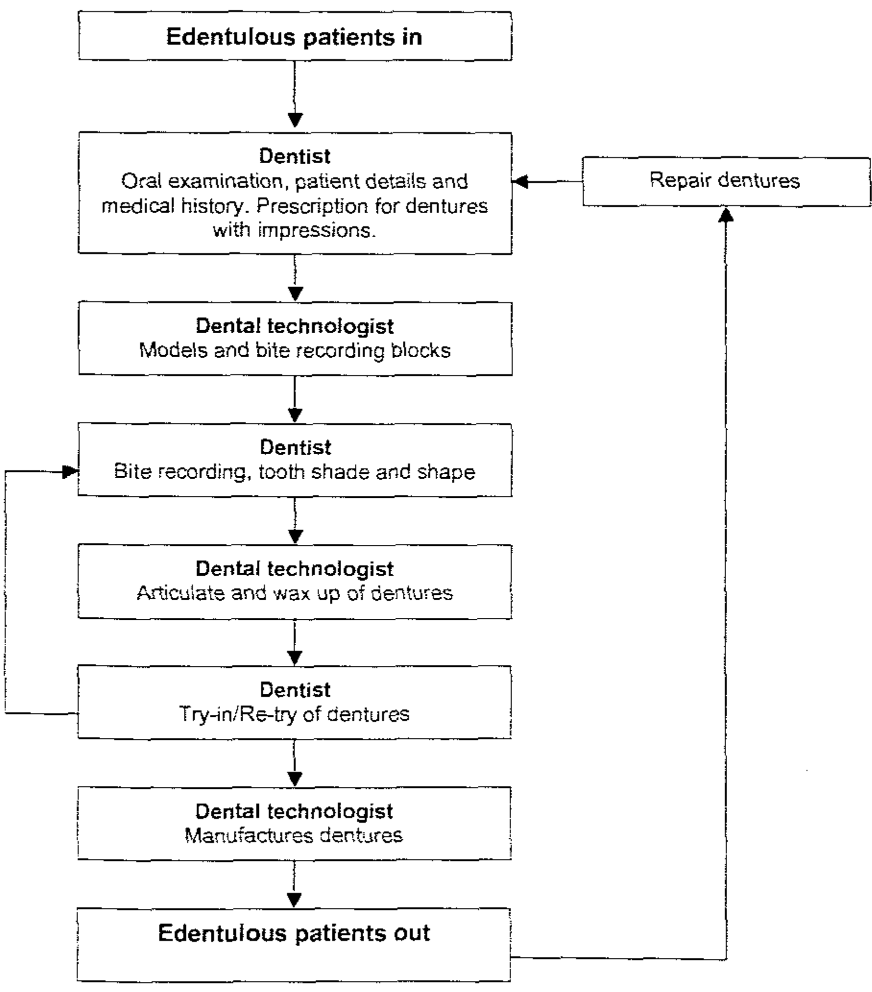

Figure 5-1. Current denture provision system

The current denture provision system is well known to all dental personnel and patients, but may portray certain shortcomings. However, it is not the objective of this study to question the relevancy of the current system, but to work towards a more effective concept of delivering a much-needed service to the denture need identified.

The current system can be summarised as follows:

Edentulous patients in need of full dentures make an appointment with a dentist. The dentist will record the patient's personal details and dental history. An oral examination is performed to determine if the patient's oral mucosa is healthy and suitable to receive for full dentures. In some instances a radiographic investigation may be required to determine sub-mucosal (bony) abnormalities. If the patient is not suitable to receive dentures, they are referred for medical treatment.

If the oral environment of a patient is healthy, mandibular and maxillary impressions are taken. These impressions are sent to the dental laboratory where primary models are made. Normally during this stage, bite recoding blocks and special trays will be manufactured which are returned to the dentist. The dentist will take a final set of impressions, record the bite relation with the bite recording blocks and determine the shade and shape of the denture teeth. These are returned to the dental laboratory, where the final set of models are made and articulated. In several instances the dental technologist would select the size and the shape of the denture teeth to be used in the wax set-up. A waxed-up set of dentures is sent to the dentist for a so-called "try-in" as figure 5-1 indicates. In the event of the bite relation needing to be changed or altered, the same case is again returned to the laboratory. In either case, the waxed-up set of dentures is sent back to the dental laboratory to be finished.

Due to the fact that there are so many steps involved in this process and in most cases the dental laboratory and the dental surgery is not in close proximity to each other, the work is often transported over great distances and susceptible to temperature changes; errors would inevitably occur, which would result in a patient having to inconvenienced by coming in more than is necessary. Dental personnel are aware that patients have to make arrangements, i.e. taking off from work, to visit a dentist. Both the dentist and technologist endeavour to produce good quality work, to keep this inconvenience to a minimum. Although a lengthy procedure, a good set of dentures, is normally the result.

It is clear from the above information that dentists and dental technologists currently have decidedly different roles and responsibilities with regard to the dental process.

5.4 Proposed dental roles and responsibilities with regard to edentulous patients

An extension of the dental technologist's current role, could however, be achieved in the form of a service facilitator for the edentulous patient as suggested in figure 5.2 below:

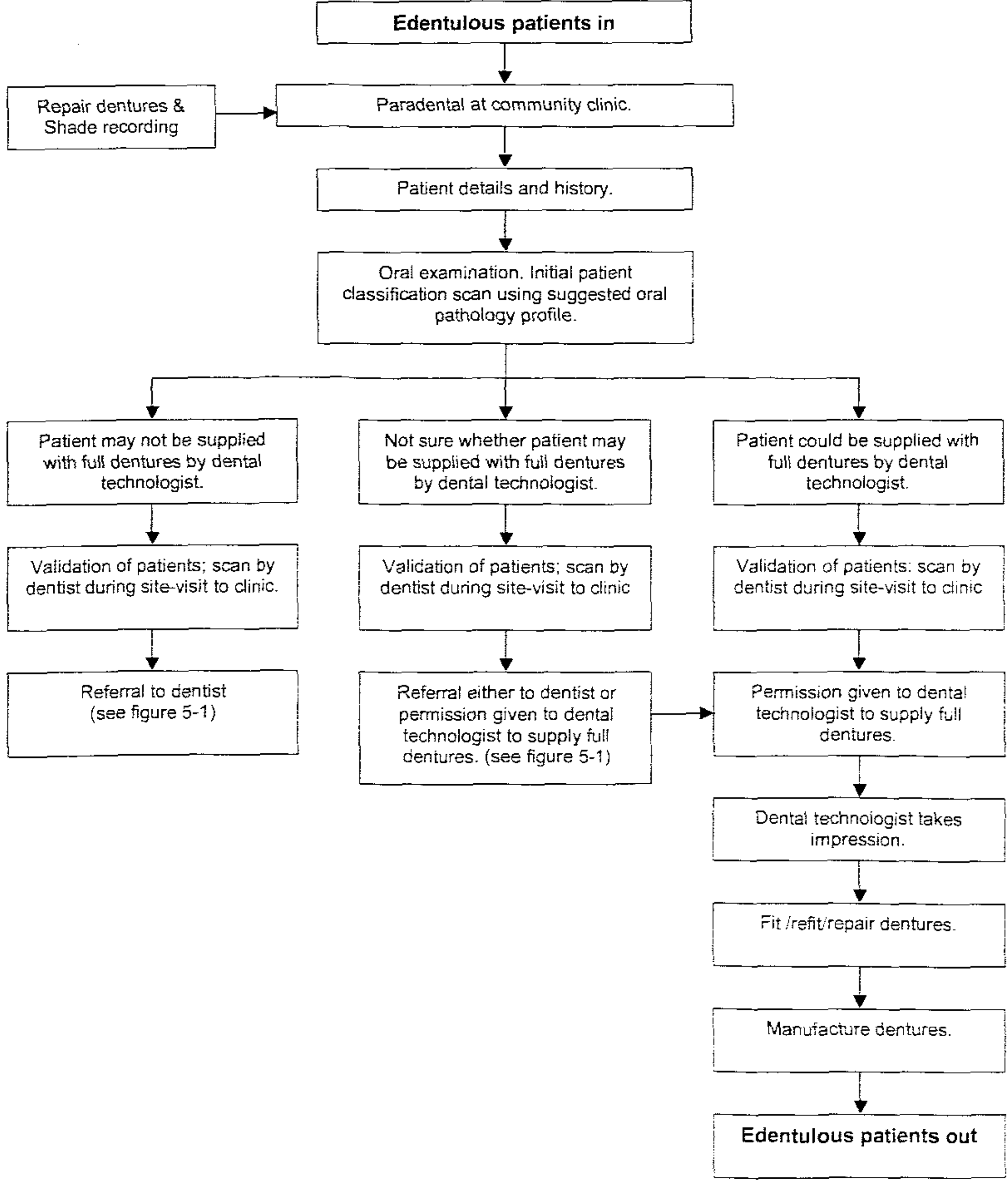

Figure 5-2. Proposed concept of denture provision to communities

5.5 The proposed concept of denture provision to communities

This proposed concept is based on the following assumptions:

- All patients being dealt with in this manner are edentulous.
- That the dental technologist will receive adequate training in dealing directly with patients.
- That the dental technologist will receive adequate knowledge in facilitating an initial screening of edentulous patients in terms of their needs.
- That the dental technologist initiates no further work unless validated by a dentist.

The rationale for such a community service concept is based on the provision of cost effective service for edentulous patients that would extend to a larger section of the population.

The proposed concept in figure 5.2 above is seen to work as follows:

Edentulous patients in need of full dentures may report to a local clinic in larger numbers without prior arrangement on a set "screening-day", where an adequately skilled paradental individual performs a basic visual oral examination. As set out in this chapter, the paradental will use the clinical knowledge to determine whether the edentulous individuals are healthy enough to receive complete dentures, or not. A very simple and clear decision will be made, only to decide if such edentulous individuals are suitable to receive dentures or not, very similar to the pre-screening process at the dental training schools. It is important to note that no treatment whatsoever will commence at this stage. The individuals that are found unsuitable to receive dentures because they may exhibit oral pathoses are referred to the local dental hospital or state dentist. The healthy edentulous individuals selected according to the paradental's judgment, are asked to gather once a week at the same local clinic. An arrangement with the local state dentist for the same day is made to perform a final oral examination. If any doubt exists with the dentist on the

condition of any patient's oral health, the dentist excludes the patient from this pre-selected group, and if necessary refers the patient to a hospital for further treatment, or if possible deals with the patient's condition immediately. The final remaining group are then diagnosed as, suitable for denture provision. Each of these patients is then signed off as healthy. The great benefit of this small alteration to the present system is that edentulous individuals can be supplied with dentures on a larger scale, up to 40 to 60 individuals per week, depending on the size, capability and workforce of the dental laboratory.

The skilled paradental staff then takes over the mechanical procedures that the dentist would normally do. Any hazard or doubt that an unsuitable patient might receive a denture is eliminated. Thus, from the impression-taking stage to the final product, the patients are not exposed to any risk. The advantages of the proposed community service concept is that a larger number of complete dentures of the same quality can be supplied to poor and middle class segments of the population in need of complete dentures.

5.6 The proposed oro-pathological module

For the proposed community service model to operate effectively, it would be necessary for dental technologists to have some formal awareness of the existence (or not) of oral pathological conditions in patients.

The current research has sows that 76,9% of edentulous patient in the Western Cape of South Africa exhibit no oral lesions, and would therefore not present a problem to the classification of such in the proposed community service model. This research has however also shown that 23,1% of patients does exhibit oral lesions, and the identification of such would be useful to the dental technologist in the initial screening process. Table 5-1 below shows the occurrence for normal aberrations and oral pathoses for the present study, as compared to similar South African studies and an average value for such from the international surveys.

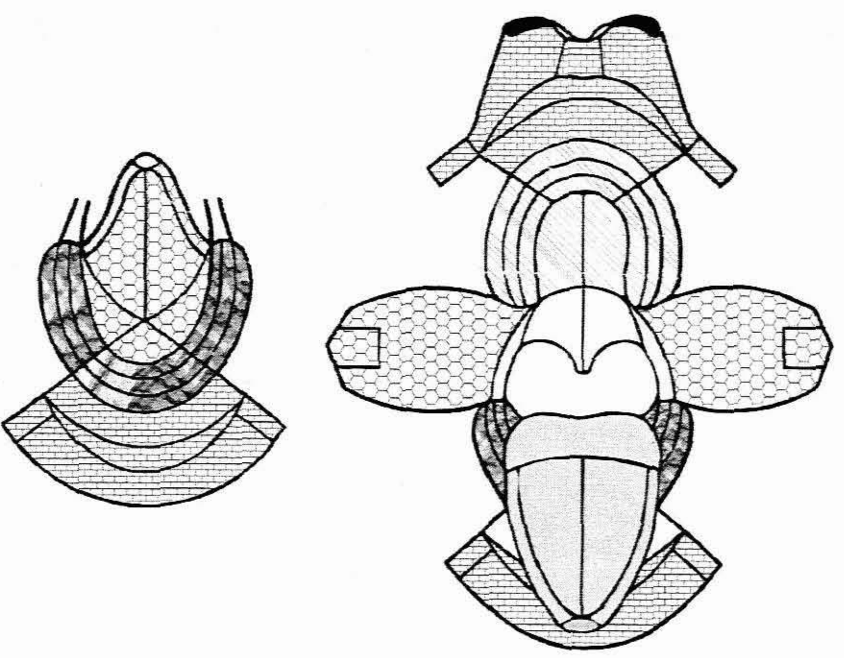

Figure 5-3. **Schematic diagram of the oral environment**

Table 5-1. **Location of oral lesions**

						Current study	International average.	RSA average
Normal aberrations	**Maxillary fitting surface**	**Mandibular fitting surface**	**Tongue area**	**Sulcus and buccal**	**Extra oral**	%	%	%
4.5.1 Mobile alveolar ridge	•	•				2,6	2,2	4
4.5.2 Oral mucosal pigmentation	•	•		•	•	1,9	1,15	0.7
4.5 3 Chronic cheek chewing				•		1,0	0,38	0.25
4 5.4 Torus Palatinus	•					0,7	0,08	0.58
4 5.5 Torus Mandibularis		•				0,5	0,08	0.58
4.5.6 Geographic tongue			•			0,5	0,25	1,58
4.5.7 Plicated tongue			•			-	0,25	2.2
4 5.8 Sublingual varicosity				•		0,3	3.2	0.08
4.5.9 Active frenum	•	•				0,3	0,02	0.08
4.5.10 Macroglossia			•			0,2	0,16	0.05
4.5.11 Cleft palate	•					0,2	0,16	0.08
4.5.12 Fissured tongue			•			0,2	0,01	2.8
4.5.13 Pneumatisation of the maxillary antrum	•					0.2	0,01	0.05
4.5.14 Cavernous hemangioma				•		0,2	0,01	0.05
4.5.15 Exposed mental foramen		•				0,2	0,01	0.05
No oral pathoses						**76,9**	**60**	**76,4**
Oral pathoses						**23,1**	**40**	**23,6**
4.6.1 Denture stomatitis	•	•				6,96	18	18
4.6.2 Denture related lesions	•	•	•	•		5,18	4,6	25
4.6.3 White lesions	•	•	•	•		4,37	0,8	6
4.6.4 Denture related hyperplasia	•	•		•		1,94	8	12
4.6.5 Angular cheilitis					•	1,78	7,5	3
4.6.6 Median rhomboid glossitis			•			0,16	0,8	1
4.6.7 Ranula				•		0,16	0,01	0
4.6.8 Hemangioma				•		0,16	0,65	0
4.6.9 Cemento osseous dysplasias	•	•				0,16	0,01	0

The data in this table was compiled from table 2-1 in this study and appendices A-8, A-10, A-11, A-12 and A-14.

From table 5-1, the most prominent normal aberrations and oral pathoses that would be useful in effective operation of the community model for the edentulous are:

Normal aberrations (higher than 0,4% prevalence in sample):

- Oral mucosal pigmentation
- Mobile alveolar ridge
- Chronic cheek chewing
- Torus Palatinus
- Torus Mandibularis

Oral mucosal lesions (higher than 3% prevalence in sample):

- Denture stomatitis
- Denture related lesions
- White lesions

An educational module for dental technologists could thus be developed which introduces them to all the conditions as in table 5-1, but with special emphasis on the most common occurrence. These can only be identified if the "normal" oral condition is well known to the operator.

An additional module on "professional ethics" and jurisprudence would also be useful to the dental technologist in terms of dealing directly with patients.

Chapter 6 Conclusion and further research

6.1 Review of the research

Investigations of the occurrence of oral mucosal lesions are undertaken for a number of reasons, among which are to establish straightforward occurrence rates for specific lesions in a specific population, and to assist health administrators in the planning of services (WHO: 1980).

It was one of the objectives of this study to document the oral pathoses found in a mixed group of: state health, lower income, and medical aid patients. It is also true however, that the sample group used is not representative of the occurrence of oral pathological conditions in the broader population at large, in that patients with HIV positive-related lesions would normally have been screened out of the sample group.

However, the main reason why this study was performed was to determine the oral pathoses that a paradental would encounter if an edentulous individual required full dentures. The oral environment exhibits signs and symptoms of systemic and local pathological conditions of the human body. It is therefore of prime importance that paradental staff be able to identify the key variations of normal tissue appearance as well as any potentially harmful condition that would jeopardise the successful treatment of the patient, and where indicated, do the necessary referrals to a doctor or dentist.

6.2 Achievement of the research

An oral epidemiological profile of edentulous academic hospital patients was established. The percentage of individuals without oral lesions was established and prominent oral pathoses were identified. If it is accepted that three-quarters of the edentulous population of the Western Cape of South Africa are healthy, without any evident oral pathological conditions, many individuals could be supplied with complete dentures in the proposed community service concept. This study has indicated relevant oral pathoses that a paradental individual would find within the edentulous oral cavity. With the increasing demand for dentures and the lack of provision, modules that provide additional knowledge of clinical diagnoses to therapists, dental technologists and related dental staff to address this problem were proposed. It would appear that the extent of oral pathoses involved is not that great and could be incorporated into the current syllabi or as a new module.

With the implementation of such an education module, a small input is made, but the result can enable a broader and larger dental workforce to perform a relatively easy task that was limited only to the dentist's chair. On the other hand, before implementing such an academic module, all associated dental professions need to be consulted for constructive inputs in a real attempt to alleviate the denture need.

In the Western Cape of South Africa, during the 1996 Census, the number of elderly over the age of 65 was 183 500 (Statistics South Africa: 2002). With an increasing population of the aged, the role of the dental staff as oral physicians is of increasing importance as Scully (1999) highlighted. By implementing the proposed concept it will obviously not fully eradicate the denture need that exists, but the number of edentulous individuals in need could be reduced.

Another benefit from this proposed denture service concept is that the illegal denture providers can be displaced from the dental market. This concept's aim is not to reduce the amount of prosthetic work currently provided by dentists, but to assist the poorer segment of the edentulous population with a good set of dentures in line with proper legislation. These individuals would not be able to afford private dental fees and are those currently making use of the illegal denture provider's service. It is envisaged that overseeing bodies will regulate the proposed concept and will ensure a fair application and grant of dental work practices.

6.3 Recommendations for further study

- The implementation procedures of the proposed concept need further study and require refinement. A financial cost planning study is of the utmost importance and could easily be incorporated in to the same study.
- Similar oral pathological profiles need to be determined in other parts of the country. This may enable health authorities to understand the significance of the denture need revealed in chapter one.
- Specific training needs for dental technologist have to be determined, in conjunction with the competence expectancy the associated dental professions might have.
- The magnitude of denture provision by illegal denture providers is a key element that needs to be determined so that authorities are able to understand the bona fide denture need within certain communities.
- An in-depth study may be required to determine the relevance of regulating laboratory fees. This could give insight into the significant growth in illegal dental services.

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Glossary

Backdoor denture providers/quacks – Individuals with little or no formal training or clinical knowledge that provide an Illegal denture service to the public.

Denturism – The practice of fabrication and fitting of dentures by a dental technologist without benefit of a dentist. (Illustrated dictionary of dentistry: 1982)

Denturist – A suitably qualified dental technologist who fabricates and fits dentures for patients without the benefit of a dentist's graduate training. (Illustrated dictionary of dentistry: 1982)

Edentulous – It is a state of being without any natural teeth. The state of the oral cavity after all teeth has been lost. (Illustrated dental terminology: 1985)

Geriatrics – The aged

Full dentures – Is an appliance that replaces all of the natural teeth and associated structures of either the upper or the lower jaw.

Appendices

A.1 Letter of authority from Peninsula Technikon's science faculty research ethics committee

ETHICS APPROVAL
SCIENCE FACULTY RESEARCH ETHICS COMMITTEE
PENINSULA TECHNIKON

Ethics approval is granted to: Mr A C du Toit

for the research proposal titled.

An investigation into the implications of establishing an oral pathological profile for the preprosthetic evaluation of edentulous patients in the Western Cape of SA

which is offered in full/partial fulfilment for the degree:

M Tech (Dental Technology)

Comments

Ethics approval is hereby given to Mr A C du Toit to conduct research in accordance with the approved full research proposal attached.

....

Chairperson
Science Faculty Research Ethics Committee

date: 2 August 2002

Note
If ethics approval is withheld by any institution or organisation for whatever reason, then ethics approval from Peninsula Technikon's Science Faculty Research Ethics Committee is automatically withdrawn. Ethics approval from another institution or organisation does not automatically result in ethics approval from Peninsula Technikon's Science Faculty Research Ethics Committee.

A.2 Letter of authority from University of Stellenbosch

UNIVERSITEIT·STELLENBOSCH·UNIVERSITY
jou kennisvennoot • your knowledge partner

11 November 2002

Mnr AC du Toit
P/a Dr R Barrie
Skool vir Mondheelkunde

Geagte mnr Du Toit

NAVORSINGSPROJEK: "INVESTIGATING THE IMPLICATION OF ESTABLISHING AN ORAL PATHOLOGICAL PROFILE FOR THE PREPROSTHETIC EVALUATION OF EDENTULOUS PATIENTS IN THE WESTERN CAPE OF SOUTH AFRICA"

Hierdie projek is nagegaan en daar is geen etiese implikasies verbonde aan hierdie projek nie. Die projek kan uitgevoer word op voorwaarde dat die hospitaalowerheid toestemming verleen vir die gebruik van die lêers.

Met vriendelike groete

CJ VAN TONDER
NAVORSINGSONTWIKKELING EN -STEUN (TYGERBERG)

CJVT/ev

Afskrif: Dr R Barrie

Fakulteit Gesondheidswetenskappe · Faculty of Health Sciences

Verbind tot Optimale Gesondheid - Committed to Optimal Health

Afdeling Navorsingsontwikkeling en -steun • Division of Research Development and Support

Posbus/PO Box 19063 • 7505 Tygerberg • Suid-Afrika/South Africa
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E-pos/E-mail: cjvt@sun.ac.za

A.3 Letter of authority from the Department of Health, Oral and Dental teaching hospital

Verwysing
Reference
Isalathiso

Navrae
Enquiries
Imibuzo Dr R B Barrie

Telefoon
Telephone
Ifowuni (021) 937-3008

Departement van Gesondheid
Department of Health
iSebe lezeMpilo

Mr AC du Toit
Dept of Dental Services
Peninsula Technikon

ACCESS TO PATIENT FOLDERS

Authorisation is hereby given for you to access the 620 patient folders at the Tygerberg Oral Health Centre for your research project, on the understanding that patient information is treated as confidential.

Yours faithfully,

HEAD: ORAL HEALTH CENTRE; TYGERBERG

DATUM: 2003-03-06.

OPLEIDINGSHOSPITAAL VIR MOND- EN TANDHEELKUNDE. ORAL AND DENTAL TEACHING HOSPITAL

KORRESPONDENSIE AAN:
Die Bestuurder
Privaatsak X1
7505, TYGERBERG

CORRESPONDENCE TO:
The Manager
Private Bag X1
7505, TYGERBERG

Tel: (021) 937-3000 FAX: (021) 931-2287 E-POS/E-MAIL: haji@maties.sun.ac.za

A.4 Letter from Peninsula Technikon's Department of Dental Services

DEPARTMENT OF DENTAL SERVICES
(Quality Excellence Award Winner 1999)

Enquiries:
Ref No:

8 August 2002

Members of the Research Committee
Faculty of Health Science
School of Oral Health
University of Stellenbosch
TYGERBERG HOSPITAL

RESEARCH CO-OPERATION
M.TECH.: STUDENT MR. A.C. DU TOIT

TOPIC: AN INVESTIGATION INTO THE IMPLICATIONS OF ESTABLISHING AN ORAL PATHOLOGICAL PROFILE FOR THE PREPROSTHETIC EVALUATION OF EDENTULOUS PATIENTS IN THE WESTERN CAPE OF SA

Mr. Du Toit is registered for a M.Tech. Dental Technology in this department.

His research topic and proposal was approved by both the Faculty Research Committee and the Academic Board of the Peninsula Technikon.

His research carries our full support and trust that you will be able to assist him in his endeavors.

Yours faithfully

L.A. STEYN
HEAD: DEPT. DENTAL SERVICES

P O Box 19111 Tygerberg 7505 • Tel: (021) 933 4664 • Fax: (021) 933 1048
Website: http://www.pentech.ac.za • E-Mail: anthonym@mail.pentech.ac.za

A.5 Sample of Pilot study schedule

Folder number	Random number

Mark with a (**X**) in the relevant box

1) What is the gender of the patient?

Male	**Female**
1	2

2) What is the age of the patient?

Age	**<20**	**21-40**	**41-60**	**61-80**	**81-100**
Yrs.	1	2	3	4	5

3) Any oral pathoses present indicated on patient folder?

Oral pathoses present	**Yes**	**No**
	1	2
If yes:	**1**	**2**
Denture stomatitis	1	2
Pinpoint hyperplasia	1	2
Diffuse hyperplasia	1	2
Granular hyperplasia	1	2
Angular cheilitis	1	2
Denture related hyperplasia	1	2
White lesions	1	2
Denture related ulcers	1	2
Other	1	2
	1	2

4) Any normal aberration present indicated on patient folder?

Normal aberrations present	**Yes**	**No**
	1	2
If yes:	**1**	**2**
Geographic tongue	1	2
Oral mucosal pigmentation	1	2
Sublingual varicosity	1	2
Tori	1	2
Chronic cheek chewing	1	2
Macroglossia	1	2
Active frenums	1	2
Cleft palate	1	2
Mobile alveolar ridge	1	2
Other	1	2
	1	2

5) Comment regarding other related findings within the folder.

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____

____

____

A.6 Result of Pilot study

A6.1 Age distribution

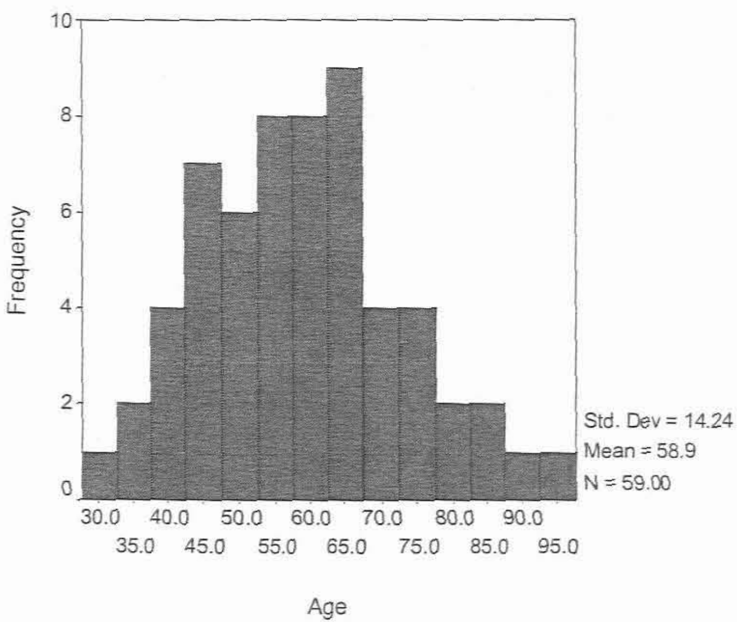

Figure A-1. Age distribution of pilot sample group

A6.2 Gender distribution

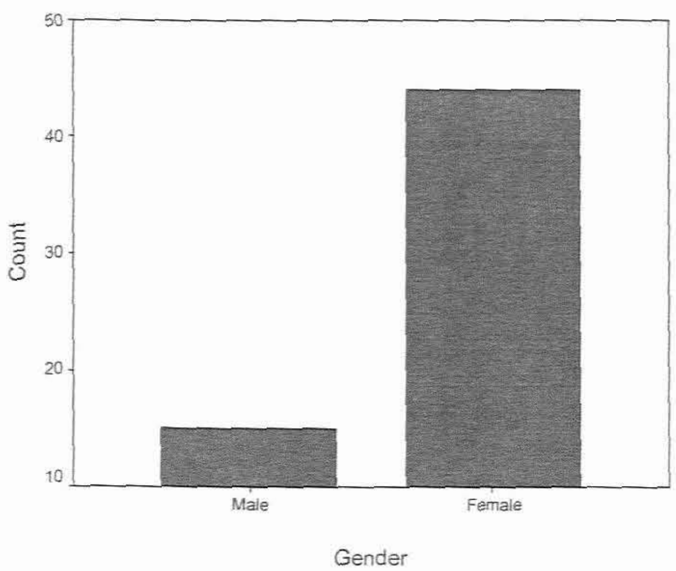

Figure A-2. Gender ratio of pilot sample group

A6.3 Recorded age categories

Table A-1. Recorded age categories of pilot sample group

Age	Frequency (n)	Percent (%)
21-40 yrs.	5	8,5
41-60 yrs.	27	45,8
61-80 yrs.	22	37,3
> 81 yrs.	5	8,5
Total	59	100

A6.4 Normal aberrations present

Table A-2. Normal aberrations within pilot sample group

Normal aberrations	Male N=15		Female N=44		Total N=59	
	(n) affected	(%)	(n) affected	(%)	(n) affected	(%)
Normal aberrations present	**1**	**6,7**	**3**	**6,8**	**4**	**5,1**
Oral mucosal pigmentation	1	6,7	0	0	1	1,7
Chronic cheek chewing	0	0	1	2.3	1	1.7
Geographic tongue	0	0	1	2,3	1	1,7
Cavernous haemangioma	0	0	1	2,3	1	1,7

A6.5 Oral pathoses

Table A-3. Oral pathoses within pilot sample group

Oral pathoses	Male N=15		Female N=44		Total N=59	
	(n) affected	(%)	(n) affected	(%)	(n) affected	(%)
No oral pathoses	**11**	**73,3**	**28**	**63,6**	**39**	**66,1**
Oral pathoses present	**4**	**26,4**	**16**	**36,4**	**20**	**33,9**
Denture stomatitis	0	0	6	13,6	6	10,2
Denture related ulcers	0	0	5	11,4	5	8,5
White lesions	2	13,3	1	2,3	3	5,1
Angular cheilitis	1	2,3	0	0	1	1,7
Granular hyperplasia	0	0	1	2,3	1	1,7
Hyperplasia	0	0	1	2,3	1	1,7
Cemento-osseous dysplasias	0	0	1	2,3	1	1,7

A6.6 Systemic diseases

Table A-4. Systemic diseases within pilot sample group

Systemic diseases	Male N=15		Female N=44		Total N=59	
	(n) affected	(%)	(n) affected	(%)	(n) affected	(%)
Systemic diseases present	**6**	**40**	**19**	**43,2**	**25**	**42,4**
Hypertension	4	26,7	11	25	15	25,4
Asthma	1	6,7	5	11,4	6	10,2
Allergy	0	0	4	9,1	4	6,8
Diabetes	0	0	4	9,1	4	6,8
Heart	2	13,3	1	2,3	3	5,1
Penicillin	1	6,7	1	2,3	2	3,4
Bleeding tendency	1	6,7	1	2,3	2	3,4
Emphysema	1	6,7	0	0	1	1,7
Rheumatic fever	0	0	1	2,3	1	1,7
Hormone replacement	0	0	1	2,3	1	1,7

A.7 Sample of Final survey schedule

Folder number	Random number

Mark with a (**X**) in the relevant box

1) What is the gender of the patient?

Male	**Female**
1	2

2) What is the age of the patient?

Age	**<20**	**21-40**	**41-60**	**61-80**	**81-100**
Years	1	2	3	4	5

3) Any normal aberration present indicated on patient folder?

Normal aberrations present	**Yes**	**No**
	1	2
If yes:	**1**	**2**
Geographic tongue	1	2
Oral mucosal pigmentation	1	2
Sublingual varicosity	1	2
Tori	1	2
Chronic cheek chewing	1	2
Macroglossia	1	2
Active frenum	1	2
Mobile alveolar ridge	1	2
Other	1	2
	1	2

4) Any oral pathoses present indicated on patient folder?

Oral pathoses present	**Yes**	**No**
	1	2
If yes:	**1**	**2**
Denture stomatitis	1	2
Ulcerations & related lesions	1	2
Angular cheilitis	1	2
White lesions	1	2
Frictional keratosis	1	2
Lichen planus	1	2
Tongue related pathoses	1	2
Leukoplakia	1	2
Other	1	2
	1	2

5) What was the age of the current denture?

Age
Year(s)

6) Systemic diseases, medical problems and medications used.

Systemic diseases medical problems and medication used	**Yes**	**No**
	1	2
If yes:	**1**	**2**
Hypertension	1	2
Cardiac related disorders	1	2
Diabetes mellitus	1	2
Epileptic episodes	1	2
Bleeding tendency	1	2
Rheumatic fever	1	2
Blood dyscrasias	1	2
Asthma	1	2
Allergy What:	1	2
Penicillin allergy	1	2
Hormonal replacement therapy	1	2
Corticosteroid treatment	1	2
Other	1	2
	1	2

7) Comment regarding systemic disease related findings within the folder.

____

8) Comment regarding other findings within the folder.

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A.8 Result of Final survey

A8.1 Age distribution

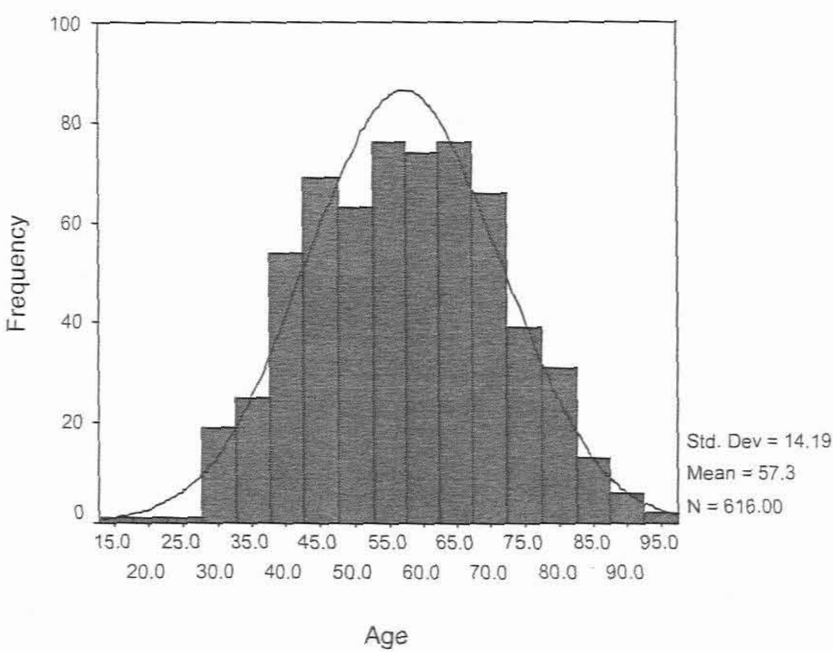

Figure A-3. Age distribution

A8.2 Gender distribution

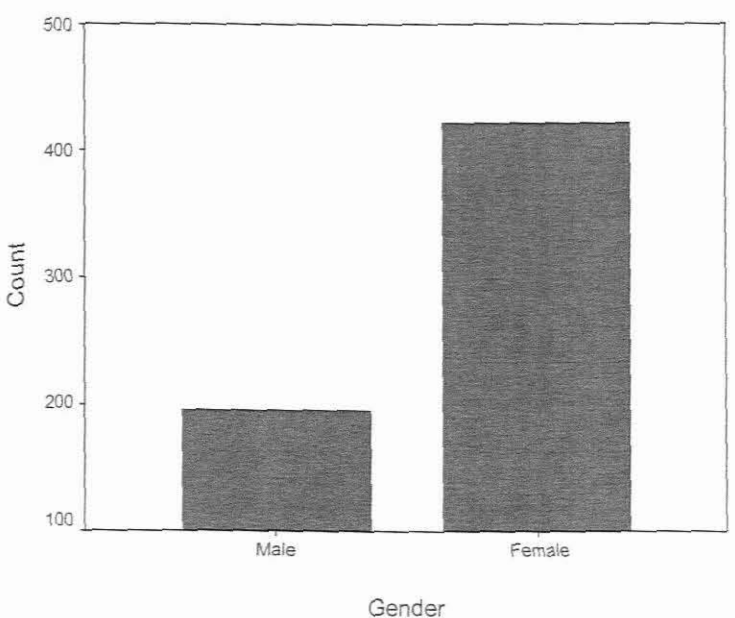

Figure A-4. Gender distribution

A8.3 Recorded age categories

Table A-5. Recorded age categories

Age	Frequency (n)	Percentage (%)
< 20 yrs.	1	0.2
21-40 yrs.	81	13,1
41-60 yrs.	270	43,8
61-80 yrs.	235	38,1
> 81 yrs.	29	4,7
Total	616	99,8

Note: One female folder not indicating age.

A8.4 Normal aberrations

Table A-6. Occurrence of normal aberrations in the present sample group

Normal aberrations	Male N=195		Female N=422		Overall N=617	
	(n) affected	(%)	(n) affected	(%)	(n) affected	(%)
Normal aberrations	**18**	**9,23**	**35**	**8,29**	**50**	**8.58**
Mobile alveolar ridge	7	3,58	9	2,13	16	2.59
Oral mucosal pigmentation	5	2,56	7	1,66	13	2,11
Tori	0	0	6	1,42	6	0.97
Chronic cheek chewing	3	1,54	3	0,71	6	0,97
Geographic tongue	1	0.51	2	0.23	3	0,49
Sublingual varicosity	1	0.51	1	0,23	2	0,32
Active frenum	1	0,51	1	0.23	2	0,32
Fissured tongue	0	0	1	0.23	1	0,16
Macroglossia	0	0	1	0.23	1	0,16
Cleft palate	0	0	1	0.23	1	0,16
Pneumatisation of the maxillary antrum	0	0	1	0.23	1	0,16
Cavernous haemangioma	0	0	1	0.23	1	0,16
Exfoliated mental foramen	0	0	1	0,23	1	0,16

A8.5 Oral pathoses present

Table A-7. Oral pathoses present within the present sample group indicating the different age groups according to gender

Age	Male N=195		Female N=422		Overall N=617	
	(n) affected	(%)	(n) affected	(%)	(n) affected	(%)
< 20 yrs.	1	0,5	0	0	1	0,2
21-40 yrs.	25	12,8	56	13,3	81	13,1
41-60 yrs	71	36,4	199	47,2	270	43,8
61-80 yrs.	89	45,6	146	34,6	235	38,1
> 81 yrs.	9	4,6	20	4,7	29	4.7
Total	195	100	421	99,7	616	99,8

Note: One female folder not indicating age.

Table A-8. Oral pathoses in the present sample group according to gender

Oral mucosal lesions	Male N=195		Female N=422		Overall N=617	
	(n) affected	(%)	(n) affected	(%)	(n) affected	(%)
Healthy oral environment	**146**	**74,9**	**337**	**79.9**	**483**	**78,2**
Oral lesions present	**49**	**25,1**	**85**	**20,1**	**134**	**21,7**
Denture stomatitis	15	7,69	28	6,63	43	6,96
Granular hyperaemia	2	1,36	2	0,47	4	0,64
Denture related lesions	12	6,15	20	3,24	32	5,18
White lesions	9	4,61	18	4,26	27	4,37
Denture hyperplasia	5	2,56	7	1,65	12	1,94
Angular cheilitis	6	3.07	5	1,18	11	1,78
Hemangioma	0	0	1	0,23	1	0,16
Conjunctivitis	0	0	1	0,23	1	0,16
Ranula	0	0	1	0,23	1	0,16
Median rhomboid glossitis	0	0	1	0,23	1	0,16
Cemento osseous dysplasias	0	0	1	0.23	1	0.16

A8.6 Systemic diseases, medical problems and medication used

Table A-9. Systemic diseases, medical problems and medication used in the present edentulous sample group

Systemic diseases	Male N=195		Female N=422		Total N=617	
	(n) affected	(%)	(n) affected	(%)	(n) affected	(%)
Systemic diseases present	**68**	**34,8**	**168**	**39,8**	**236**	**38,2**
Hypertension	31	15,9	109	25,8	140	22,6
Diabetes mellitus	11	5,6	29	6,9	40	6,48
Heart	16	8,2	25	5,9	41	6,6
Penicillin	13	6,7	25	5,9	38	6,2
Asthma	9	4,6	18	4,3	27	4,3
Allergy	7	3,6	18	4,3	25	4,1
Bleeding tendency	6	3,1	7	1,7	13	2,1
Rheumatic fever	4	2,1	9	2,1	13	2,1
Hormone replacement	0	0	12	2,8	12	1,9
Epilepsy	5	2,6	6	1,4	11	1,7
Cortisone treatment	5	2,6	2	0,5	7	1,1
Arthritis	1	0,5	1	0,2	2	0,3
Morphine	0	0	2	0,5	2	0,3
Blood related sickness	1	0,5	1	0,2	2	0,3
Emphysema	1	0,5	0	0	1	0,1

A.9 Comparisons with similar studies

Table A-10. Comparison of normal aberrations and hereditary conditions in related South African surveys

					Avg.
Sample size (N)	617	1787	510	759	918
Denture wearers (n)	617	612	453	340	506
Year of study	2003	1998	1979	1978	/
Country	South Africa	South Africa	South Africa	South Africa	/
Researcher	du Toit	Hartshorne	Watermeyer	Dreyer	/
	(%)	(%)	(%)	(%)	(%)
Normal aberrations	5,5	-	-	-	**1,38**
Fissured tongue	0,2	-	-	11	**2,8**
Plicated tongue	-	-	-	8,8	**2,2**
Geographic tongue	0,5	-	3,2	2,6	**1,58**
Oral mucosal pigmentation	1,9	-	-	0,9	**0,7**
Mobile alveolar ridge	2,6	-	-	-	**0,65**
Tori	1,0	-	-	1,3	**0,58**
Chronic cheek chewing	1,0	-	-	-	**0,25**
Sublingual varicosity	0,3	-	-	-	**0,08**
Active frenum	0,3	-	-	-	**0,08**
Macroglossia	0,2	-	-	-	**0,05**
Cleft palate	0,2	-	-	-	**0,05**
Pneumatisation of the maxillary antrum	0,2	-	-	-	**0,05**
Cavernous haemangioma	0,2	-	-	-	**0,05**
Exfoliated mental foramen	0,2	-	-	-	**0,05**

Table A-11. Comparison of normal aberrations and hereditary conditions in related international oral surveys

													Avg
Sample size (N)	**617**	**308**	**338**	**486**	**537**	**338**	**270**	**121**	**140**	**107**	**233**	**200**	**308**
Denture wearers (n)	**617**	**63**	**165**	**139**	**284**	**165**	**113**	**121**	**36**	**71**	**205**	**200**	**182**
Year of study	**2003**	**2002**	**1997**	**1995**	**1994**	**1992**	**1991**	**1990**	**1990**	**1988**	**1989**	**1985**	**/**
Country	**South Africa**	**Spain**	**Finland**	**Malaysia**	**China**	**Israel**	**Brazilian**	**Scotland**	**Canada**	**England**	**England**	**Canada**	**/**
Researcher	**du Toit**	**Garcia-Polo Vallejo**	**Nevalainen et al.**	**Taiyeb Ali et al.**	**Corbet et al.**	**Moskona & Kaplan**	**Jorge et al.**	**Cumming et al.**	**Kuc et al.**	**Tobias & Smith**	**Hoad-Reddick**	**Dorey et al.**	**/**
Sublingual varicosity %	0,32	31,7	-	-	7,0	-	-	-	-	-	-	-	13
Normal aberrations %	5,5	-	-	-	-	-	-	-	-	-	-	-	6
Oral mucosal pigmentation %	1,9	7,9	-	4,9	1,0	-	-	-	-	-	-	-	4
Mobile alveolar ridge %	2,6	-	-	-	-	23,8	-	-	-	-	-	-	**2,2**
Geographic tongue %	0,5	-	-	-	-	-	-	-	-	-	2,0	0,5	1
Tori %	0,97	-	-	-	-	-	-	-	-	-	-	-	1
Chronic cheek chewing %	0,97	1,6	-	-	-	-	-	-	-	-	1,0	1,0	1
Active frenum %	0,32	-	-	-	-	-	-	-	-	-	-	-	0
Macroglossia %	0,16	-	-	-	-	-	-	-	-	-	-	-	0
Cleft palate %	0,16	-	-	-	-	-	-	-	-	-	-	-	0
Fissured tongue %	0,16	-	-	-	-	-	-	-	-	-	-	-	0
Pneumatisation of the maxillary antrum %	0,16	-	-	-	-	-	-	-	-	-	-	-	0
Cavernous haemangioma %	0,16	-	-	-	-	-	-	-	-	-	-	-	0
Exfoliated mental foramen %	0,16	-	-	-	-	-	-	-	-	-	-	-	0

All values listed in tables as percentage,"%"

Table A-12. Comparison of oral pathological studies in related international surveys

													Avg.
Sample size (N)	617	308	338	486	537	338	270	121	140	233	107	200	280
Denture wearers (n)	617	63	165	139	284	165	113	121	36	205	71	200	142
Year of study	2003	2002	1997	1995	1994	1992	1991	1990	1990	1989	1988	1985	/
Country	South Africa	Spain	Finland	Malaysia	China	Israel	Brasilia	Scotland	Canada	England	England	Canada	/
Researcher	du Toit	Garcia-Polo Vallejo	Nevalainen et al.	Taiyeb Ali et al.	Corbet et al.	Moskona & Kaplan	Jorge et al.	Cumming et al.	Kuc et al.	Hoad-Reddick	Tobias & Smith	Dorey et al.	/
Healthy oral environment %	77,0	48,9	62,1	77,2	60,0	41,8	41,0	46,0	88,0	59,0	96,3	40,0	60
Lesions present %	23,0	51,1	37,9	22,8	40,0	58,2	59,0	54,0	12,0	41,0	3,7	60,0	40
Denture stomatitis %	7,0	30,1	-	-	10,0	22,5	47,8	54,0	11,5	15,0	-	26,0	18
Pinpoint hyperaemia	-	-	-	-	-	5,0	24,8	33,0	-	38,0	-	4,0	8,7
Diffuse erythema %	-	-	-	-	-	-	17,7	14,8	-	3,0	-	2,0	3.1
Granular hyperaemia %	1,9	-	-	-	-	-	5,3	5,7	-	-	-	12,0	2
Denture hyperplasia %	1,9	22,2	-	-	9,0	19,8	23,0	-	-	20,0	-	-	8
Angular cheilitis %	1,8	7,9	6,0	-	1,0	11,1	7,1	38,8	1,5	7,0	-	7,5	7,5
Denture related lesions %	5,2	-	-	2,5	-	-	-	-	-	20,0	-	28,0	4,6
Traumatic ulcer %	-	14,2	-	2,9	5,0	-	3,5	-	-	2,0	-	8,0	2,9
Frictional keratosis %	-	9,5	-	-	6,0	-	-	-	-	-	-	12,0	2,3

Table A-12. **Comparison of oral pathological studies in related international surveys (cont.)**

													Avg.
Sample size (N)	617	308	338	486	537	338	270	121	140	233	107	200	280
Denture wearers (n)	617	63	165	139	284	165	113	121	36	205	71	200	142
Country	South Africa	Spain	Finland	Malaysia	China	Israel	Brasilia	Scotland	Canada	England	England	Canada	/
Year of study	2003	2002	1997	1995	1994	1992	1991	1990	1990	1989	1988	1985	/
Researcher	du Toit	Garcia-Polo Vallejo	Nevalainen et al.	Taiyeb Ali et al.	Corbet et al.	Moskona & Kaplan	Jorge et al.	Cumming et al.	Kuc et al.	Hoad-Reddick	Tobias & Smith	Dorey et al.	/
Tongue conditions %	-	7,0	-	10,7	-	-	-	-	-	-	-	1,0	1,6
Coated changes of tongue %	-	1,6	7,0	6,6	-	-	-	-	-	-	-	-	1,26
White lesions %	4,4	-	-	4,3	-	-	-	-	-	0,4	-	1,0	0,8
Leukoplakia %	-	1,6	-	-	-	-	-	-	-	7,0	-	0,5	0,76
Hemangioma %	0,2	7,7	-	-	-	-	-	-	-	-	-	-	0,65
Papilloma %	-	-	-	-	-	-	-	-	-	4,0	-	1,0	0,42
Oral candidiosis %	-	-	-	-	-	-	-	-	-	-	3,7	1,0	0,39
Oral cancer %	-	-	-	0,4	-	-	-	-	-	1,0	-	1,0	0,2
Epulis fissuratum %	-	-	-	-	-	-	-	-	-	-	-	2,0	0,16
Black hairy tongue %	-	1,6	-	-	-	-	-	-	-	-	-	-	0,13
Atrophic tongue %	-	-	-	1,03	-	-	-	-	-	-	-	-	0,09
Median rhomboid glossitis %	0,4	-	-	-	-	-	-	-	-	-	-	-	0,03
Cemento osseous dysplasias %	0,2	-	-	-	-	-	-	-	-	-	-	-	0,01
Ramula %	0,2	-	-	-	-	-	-	-	-	-	-	-	0,01

Table A-13. Frequency ratio of normal edentulous oral tissue conditions

Researcher	Individuals with no oral pathoses (% Yes)	Individuals with oral pathoses present (% No)	Ratio (Yes : No)
Present study (2002)	77	23	1:0,29
Dreyer (1978)	59	41	1:0,69
Watermeyer (1979)	70,7	29,3	1:0,41
Hartshorne (1998)	83,3	16,7	1:0,16
Moskona & Kaplan (1992)	41,8	58,2	1:1,41
Jorge et al. (1991)	41	58	1:1,41
Cumming et al. (1990)	46	54	1:1,17
Nevalainen et al. (1997)	62,1	37,9	1:0,61
Tobias & Smith (1988)	96,3	3,7	1:0,03
Taiyeb Ali et al. (1995)	77,2	22,8	1:0,29
Kuc et al. (1990)	88	12	1:0,13
Corbett et al. (1994)	60	40	1:0,66
Hoad-Reddick (1989)	59	41	1:0,69

Table A-14. Comparison of oral pathological studies in related South African surveys

					Avg.
Sample group (N)	**617**	**1787**	**510**	**759**	**918**
Denture wearers (n)	**617**	**612**	**453**	**340**	**501**
Country	**South Africa**	**South Africa**	**South Africa**	**South Africa**	/
Year of study	**2003**	**1998**	**1979**	**1978**	/
Researcher	**du Toit**	**Hartshorne**	**Watermeyer**	**Dreyer**	/
	(%)	(%)	(%)	(%)	(%)
Healthy oral environment	**77,0**	**85,7**	**26,4**	**48,1**	**76,4**
Lesions present	**23,0**	**14,3**	**74,6**	**51,9**	**23,6**
Denture stomatitis	7,0	16,5	20,0	28,5	18
Diffuse erythema	-	50,0	-	-	12,5
Pinpoint hyperaemia	-	23,0	-	25,9	12,2
Granular hyperaemia	0,6	27,0	-	2,6	7,8
Denture related lesions	5,2	-	45,0	23,8	18.5
Tongue conditions	-	0,17	28,0	0,8	7,2
Denture-related hyperplasia	1,9	-	15,0	8,2	5,8
White lesions	4,4	-	6,2	6,0	4,1
Atrophic tongue	-	-	14,0	-	3,5
Leukoedema	-	-	-	13,9	3,5
Traumatic ulcer	-	2,64	9,0	2,6	3,5
Angular cheilitis	1,8	3,30	4,5	0,5	2,5
Leukoplakia	-	0,33	-	7,2	1,8
Nicotinic stomatitis	-	-	-	3,9	1
Epulis fissuratum	-	2,48	-	-	0,6
Frictional keratosis	-	-	0.02	2,6	0,6
Atrophy of tongue papillae	-	-	-	1,6	0,4
Median rhomboid glossitis	0,5	-	-	1,2	0,4
Fibro epithelial polyps	-	-	-	1,3	0,3
Oral candidiosis	-	-	-	0,5	0,1
Papilloma	-	-	-	0,5	0,1
Mucoceles	-	-	-	0,5	0,1
Recurrent Aphthae	-	-	-	0,5	0,1
Hairy tongue	-	-	-	0,4	0,1
Coated changes of tongue	-	-	-	0,4	0,1
ANUG	-	-	-	0,3	0,07
Black hairy tongue	-	-	0,3	-	0,07
Cemento osseous dysplasias	0,2	-	-	-	0,05
Ranula	0,2	-	-	-	0,05

Table A 15. Comparison of oral lesions in South African HIV positive sample groups

				Avg.
Sample size (N)	**270**	**8418**	**565**	/
Year of study	**2002**	**1998**	**1997**	/
Researcher	**Kamiru & Naidoo**	**Bernitz & Ligthelm**	**Arendorf et al.**	/
	(%)	(%)	(%)	(%)
Any oral disease present	-	-	55,9	-
Candidiosis	-	4	37,8	-
Pseudo-membranous candidiosis	27,4	-	12,8	21,55
Erythematous candidiosis	25,6	-	15,5	20,55
Geographic tongue	-	11,3	-	11,30
Oral hairy leukoplakia	11,9	2	18,6	11,20
Oral ulceration	11,5	2	2,9	7,2
Angular cheilitis	14,1	0,67	6,0	7,16
Torus mandibularis	-	4	-	4
Herpes stomatitis	-	3,33	-	3,33
Hemangioma	-	3,33	-	3,33
Fibrous epulis	-	-	3,33	3,33
Oral lichen planus	-	2,67	-	2,67
Acute necrotizing ulcerative gingivitis (ANUG)	-	-	2,1	2,1
Gingivitis	-	-	1,3	1,3
Kaposi's sarcoma	0,7	-	1,5	1,1
Melanotic hyperpigmentation	-	-	0,8	0,8
Salivary gland enlargement	-	-	0,8	0,8
Herpes zoster	-	0,67	-	0,67
Non-Hodgkin's lymphoma	0,7	-	0.5	0,6
Herpes simplex infection	-	-	0.5	0,5
Focal epithelial lymphoma	-	-	0,4	0,4

"FINIS"