

Hepatitis C infection and associated oral health problems

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Abstract

Hepatitis C infection is widespread throughout the community. This study aimed to assess the status of oral health of persons infected with hepatitis C. DMFT and CPITN indices were recorded at a clinic providing priority dental care for people with hepatitis C infection. The data were compared with information from an existing survey of general dental patients. Social impact was assessed using a modified Oral Health Impact Profile questionnaire. The DMFT index differed significantly between hepatitis C and general patients. The number of decayed and missing teeth was greater in those infected with hepatitis C for all patients aged between 25 and 50 years. Although there was no significant difference in CPITN categories for subjects evaluated, a marked trend for poor periodontal health was noted for those individuals with hepatitis C. Salivary flow was reduced in 50 per cent of hepatitis C infected subjects. Social impact was significantly affected with 71 per cent of hepatitis C subjects reporting painful aching in the mouth and 56 per cent having difficulty in relaxing. In conclusion, the results from the project strongly indicate an urgent need for priority delivery of dental care for people with hepatitis C infection.

Key words: Hepatitis C, DMFT, CPITN, social impact, salivary flow.

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Introduction

These are estimated to be 196 000 people infected with hepatitis C in Australia. Previous studies¹⁻⁵ have projected the medical treatment requirements for these people based on epidemiological statistics, however, there is little information available on the oral health needs of people infected with hepatitis C virus.⁶ Anecdotal evidence strongly indicates that, as a cohort within the population, people with hepatitis

C infection are prone to tooth decay, suffer loss of esteem due to poor oral aesthetics and also have difficulty with diet due to poor oral health. If indeed there is a significant oral health problem within this group of the population, then there will need to be serious consideration given to the management of their dental needs as the population affected is substantial. Because many people infected with hepatitis C are eligible for dental care provided by government clinics, the possibility that this group might require greater provision of oral health care also poses a public health concern.

The reported poor oral health of people with hepatitis C has been attributed to factors such as injecting drug use, methadone medication and poor utilization of dental services. Methadone medication is often prescribed to assist people overcome heroin addiction. The sugar content and side effects of methadone such as xerostomia are well known and these characteristics have been ascribed as causes of rampant caries and poor oral health in these patients. To assume that lifestyle issues such as heroin use,⁷ methadone medication, poor dental attendance, inadequate diet and poor oral hygiene result in poor oral health is a simplistic view. None of these factors has been accurately assessed in the literature or consequently addressed, except that the preparation of methadone has been altered to eliminate the sugar content in the assumption that this did indeed contribute to poor dental health.

Many people infected with hepatitis C have a very limited injecting drug use history and have never taken methadone to overcome drug dependency. Others infected with hepatitis C have never injected drugs at all but either acquired their infection from medical sources or the route of transmission is unknown. It needs to be ascertained if this group of people infected with hepatitis C also demonstrates significant dental disease. For example, if xerostomia is considered to be a major contributing factor in dental and oral disease, then there may be undetermined factors resulting from the chronic

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hepatitis C viral infection itself, which contribute to the reported levels of oral disease. Although as yet no human research has been carried out to support this concept, the transgenic mouse model⁸ proved that xerostomia was the first clinical symptom observed in mice infected with hepatitis C.

The provision of dental care falls outside mainstream medical funding and the costs of seeking dental treatment are often prohibitive to people with hepatitis C infection. In addition, people infected with hepatitis C who are eligible for State government dental treatment are often placed on extremely long waiting lists. It is possible that the inaccessibility of dental treatment also contributes to the reported extensive tooth destruction and subsequent poor oral health.

In order for the oral health of people with hepatitis C infection to be improved, it needs to be determined if they are disadvantaged as a community group and, if so, what contributing factors can be identified.

The aims of this study were:

1. To ascertain the oral health status of people infected with hepatitis C in South Australia.
2. To determine if their oral health status was worse than that of other community groups of similar age, gender and economic circumstance.
3. To determine the impact of oral health on the quality of life in subjects with hepatitis C infection.

Methods

Support for the development of a clinic to assess and manage the dental needs of people infected with hepatitis C was provided by the HIV and Related Programs Unit of the Department of Human Services, South Australia. Initial collection of data was obtained from individuals infected with hepatitis C who were eligible for South Australian Government dental care and were referred for assessment and care to the clinic at the Adelaide Dental Hospital. Information was obtained from these subjects between April 1998 and October 1998. Two dentists at the Adelaide Dental Hospital who had undergone standardization of examination techniques examined the subjects. Caries experience was recorded for all teeth.⁹ Carious lesions were diagnosed by clinical examination, panoramic radiograph and bitewing radiographs. The clinical appearance of all oral tissues was recorded. The presence of calculus, gingival bleeding and periodontal pocket depth were noted for index teeth from all sextants. Community Periodontal Index Treatment Needs (CPITN) categories¹⁰ were deduced from this data.

Other information noted included medications being taken, a history of abnormal liver function and any other relevant medical history that might be

pertinent to delivery of dental treatment. Dentists need to be aware of the risks of hepatocellular dysfunction including poor clotting and the potential toxicity of some prescription medications.¹¹ Subjective data were sought from subjects with hepatitis C infection on the impact of their oral health status on their quality of life and on the dryness of their mouths.¹²

Of the 87 subjects with hepatitis C infection, 82 were assessed for changes in saliva flow and pH. The subjects' salivary pH was recorded using Duotest pH 5.0-8.0 indicating paper (Macherey – Nagel GmbH, Düren, Germany). Salivary flow tests were performed to determine the presence of xerostomia.¹³ Salivary flow was measured for resting and stimulated phases. A fixed collection time of five minutes was set for both unstimulated and stimulated saliva samples. All samples collected were of whole saliva. Parafilm M¹⁴ (American National Can, Greenwich, CT, USA) was the stimulant used to obtain all stimulated saliva samples. Photographic records of the mouth were taken using a Pentax SFXn camera (Pentax, Englewood, CO, USA) with a ring flash and Kodachrome 64 ASA 35 mm transparency film (Eastman Kodak Company, Rochester, NY, USA).

As well as the data collected from the clinic at the Adelaide Dental Hospital, data were taken from an existing survey of general dental patients who had attended public dental clinics in South Australia during the 1995-96 period. Health concession cards were a requisite for eligibility to attend these clinics. A total of 753 general patients who were unemployed or from low income groups was assessed.¹⁵ Standardization of examination techniques was not performed for dentists who recorded data for general patients. Age stratified data on DMFT and CPITN were compared between general patients and hepatitis subjects.

Also, data were collected from a telephone interview survey on the social impact of oral health, 581 persons were randomly selected and interviewed.¹⁵ The interview contained two of the oral health impact questions given to the subjects with hepatitis C infection. Findings from the second and third data sources were reported previously.^{15,16}

Inferential statistical analysis was carried out for caries experience, periodontal health and the reported social impact. Means were tested using analysis of variance and proportions were tested using chi squared tests.¹⁷

All subjects were entered into the study with the approval of The University of Adelaide Ethics Committee for Human Experimentation. Subjects were advised of the reasons for the project and fully informed consent for participation in the project was obtained before proceeding.

Table 1. Characteristics of dental patients

		% of patients
Dental status	Dentate	100.0
Sex of patient	Male	48.3
	Female	51.7
Age group of patient	18-24 years	2.3
	25-34 years	13.8
	35-44 years	64.4
	45-54 years	12.6
	55-64 years	2.3
	65+ years	4.6
Language spoken at home	English only	91.7
	Italian	4.8
	Greek	1.2
	Polish	1.2
	Other	1.2
Country of birth	Australia	81.0
	Europe	13.1
	Oceania	2.4
	SE Asia	2.4
	Other	1.2

Results

A total of 87 hepatitis C infected individuals who were eligible for South Australian Government dental care were assessed in the current study. Table 1 shows the age, gender and demographic details of subjects. All subjects were dentate.

Caries experience

Figure 1 shows that the number of decayed and missing teeth and the DMFT in subjects with hepatitis C infection was greater for all patients aged between 25 and 54 years. In the age range of 35-44 years, subjects with hepatitis C had a threefold increase in the number of decayed teeth compared with patients from the same age group attending public dental health clinics (analysis of variance; $p < 0.001$). The number of missing teeth was also significantly greater for these subjects ($p < 0.01$). The number of filled teeth was less in subjects with hepatitis C in the 25-34 year age group but in the 35-44 age group, which constituted 64 per cent of the hepatitis subjects, the number of filled teeth was the same ($p < 0.01$).

Periodontal status

CPITN scores, presented in Fig. 2, demonstrated a trend for poor periodontal health in subjects with hepatitis C. Subjects were more likely to have gingival bleeding in the age groups 25-34 and 35-44 years and deep pockets in each age group. This was not statistically significant for the number of subjects evaluated.

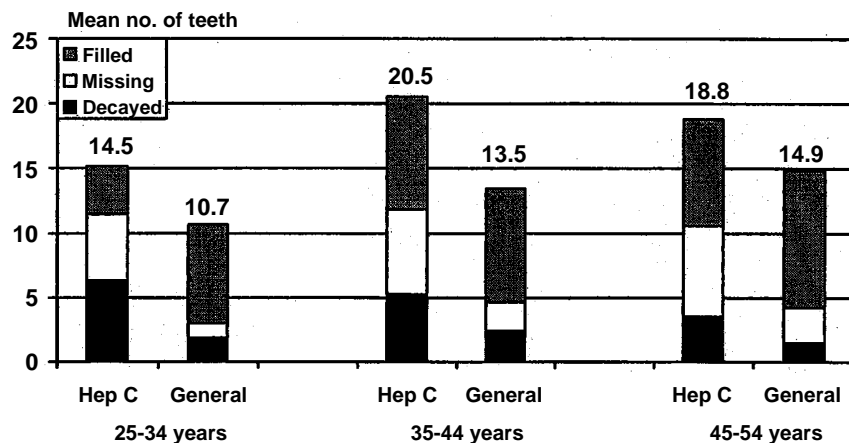


Fig. 1. – Caries experience of hepatitis C patients and general patients at South Australian public dental services.

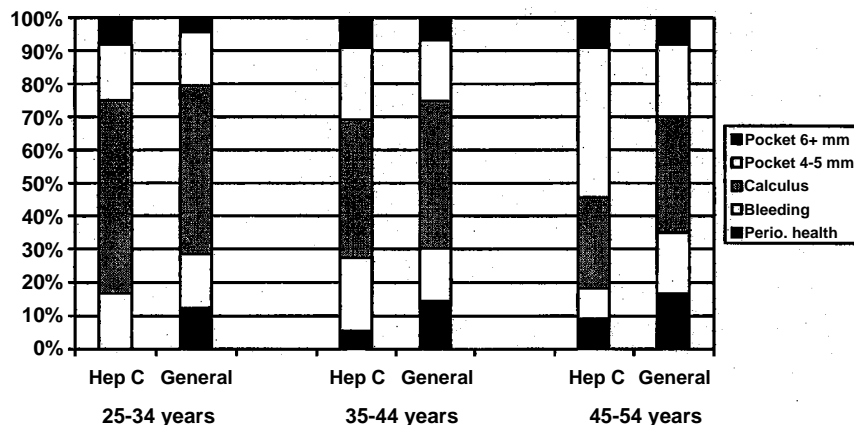


Fig. 2. – CPITN categories of hepatitis C patients and general patients at South Australian public dental services.

Table 2. Reported social impact of oral health

	% of persons reporting impact		
	Adelaide sample*	Hepatitis C patients	p (χ^2)
Had painful aching in mouth	(n=57)	(n=84)	
25-34 years	24.4	66.7	0.010
35-44 years	22.5	81.1	0.001
45-54 years	29.4	54.5	0.256
Total	24.6	71.4	0.001
Difficulty relaxing	(n=53)	(n=85)	
25-34 years	0.0	50.0	0.001
35-44 years	10.2	66.0	0.001
45-54 years	0.0	45.5	0.020
Total	3.3	56.5	0.001

*Dentate, card-holders, aged 25-54 years.

Salivary flow

Xerostomia was noted objectively in 50 per cent of the 82 subjects tested (38 males and 44 females), with 37 per cent (14/38) of the male and 59 per cent (26/44) of the female subjects demonstrating clinical xerostomia. Sixteen subjects (nine females and seven males) subjectively considered they had dry mouths but clinically registered normal salivary flow. Conversely, there were ten subjects who did not complain of dryness but demonstrated very poor salivary flow (five females and five males).

Medication

Medication was taken by 39 of the subjects. Methadone medication was taken by 18 subjects (ten males and eight females) and clinical evidence of xerostomia was noted in 33 per cent. Ten of these subjects complained of a dry mouth but clinical findings indicated normal salivary flow in four of these ten subjects. A further five subjects were taking antidepressant medication and three of these registered very low salivary flow.

Social impact

The impact of oral health was assessed by two questions, which are presented in Table 2. Overall, significantly higher percentages of subjects with hepatitis C infection reported painful aching in the mouth and difficulty relaxing because of dental problems. This pattern occurred in most age groups despite some small cell sizes, particularly for those aged 45-54 years.

Lichen planus

The presence of lichen planus was noted in seven of the 87 subjects.

Discussion

The results indicate that there is a marked discrepancy between the oral health of those infected with hepatitis C and the comparison group of the population. As both groups were eligible for public

dental care it is presumed that both had similar access problems and difficulties with waiting lists. However, the caries experience of those subjects infected with hepatitis C was significantly worse than that of the general patients examined in the public clinics. The number of missing teeth in patients with hepatitis C infection was also significantly higher than in the general patients and periodontal health tended to be poor. All of this is demonstrated in Fig. 3. One of the proposed contributing factors to poor oral health of subjects infected with hepatitis C was the lack of access to dental treatment. The results tend to discount this as a significant factor as both groups had received similar numbers of restorations, proving that people with hepatitis C were attending the dentist but that treatment was obviously proving unsuccessful or was failing. The older age groups in fact were more likely to have a greater number of fillings, again highlighting a difference in dental need between those with hepatitis C infection and the general eligible population.

Another factor implicated in poor oral health associated with hepatitis C infection was the use of methadone medication. In the Adelaide Dental



Fig. 3. – Decayed and missing teeth in a patient with hepatitis C infection.

Hospital clinic, it was observed that people on methadone medication who presented with decayed teeth predominantly had root caries with many subgingival lesions. Oral hygiene appeared to improve in those not currently injecting drugs but the ongoing tooth destruction continued. Only 20 per cent of subjects with hepatitis C infection attending the clinic were taking methadone and of these only 33 per cent demonstrated clinical xerostomia. Certainly, where carious lesions were present in this subgroup, they did indeed resemble the classic picture of cervical lesions noted in the clinic and these lesions often extended subgingivally (Fig. 5). As 66 per cent of subjects on methadone did not present with clinical xerostomia and not all subjects taking methadone presented with decayed teeth, the use of this medication cannot be directly blamed for the presence of oral disease.

Hepatitis C infection and treatment for that infection have resulted in the onset of clinical depression.³ Consequently, some subjects with hepatitis C (6 per cent) were taking antidepressant medication. Marked xerostomia was noted in this group and this medication would certainly appear to be a contributing factor in dental disease.

Very few of the subjects presenting to the clinic admitted ongoing injecting drug use. It is quite possible that tooth destruction does occur during the period of heroin use. However, for many of the subjects attending the clinic, injecting drug use had occurred over a very small period of time and often many years earlier, whereas their oral problems of concern were ongoing and had occurred subsequent to that period.

It was not anticipated that subjects with hepatitis C would have periodontal problems of greater proportions than general patients. The trend demonstrated by the results for patients infected with hepatitis C to have poor periodontal health is disturbing. Although the data is not statistically significant, it is possible that this trend will become more apparent as a larger number of subjects are evaluated. It is possible that diet and other social influences contribute to this trend and it further complicates the development of dental treatment plans that have successful outcomes.

Lichen planus was noted in only seven of the 87 subjects with hepatitis C infection. Many of the subjects with hepatitis C infection could not accurately assess the period of time they had been infected. Certainly in the older age group, hepatitis C infection was likely to have been of longer duration. It is possible that for those more recently infected, mucosal problems such as lichen planus will develop later in the course of their hepatitis C infection and, as some investigators¹⁸ have correlated an increased risk of malignancy with this lesion,

ongoing monitoring is important. Although investigations have been undertaken to assess correlation between hepatitis C-related liver disease and the presence of lichen planus,¹⁹ it appears that other oral health issues pertaining to hepatitis C infection may be more immediate.

Sporadic intermittent dental care will not address the oral health needs of those people with hepatitis C infection. If oral health and prognosis for dental treatment is to be improved, then oral care treatment plans incorporating long-term prevention components need to be developed so that the combined influences of medication, injecting drug use and the effect of infection with a chronic virus will be overcome. The use of topical fluorides, oral hygiene instruction, dietary counselling and regular recall should be combined into a comprehensive treatment protocol for patients with hepatitis C infection. Remineralization, rather than restoration of cervical lesions, may provide a more successful long-term outcome. Regular recall in public dental clinics is not a service generally provided except where dental treatment can adversely affect some medical conditions. The results of this project suggest that as subjects have a large number of missing teeth in addition to numerous restored teeth, there is a high rate of dental treatment failure. Regular recall would hopefully address this issue and provision of dental care would prove successful and consequently cost efficient.

Management of periodontal needs is a more complex issue. The success of the comprehensive treatment protocol outlined above needs to be established, as this may impact on the periodontal disease pattern, eliminating the need for invasive periodontal treatment.

The impact of hepatitis C on the oral health of subjects with hepatitis C infection was assessed by only two questions, as the results from ongoing surveys on general patients are yet to be evaluated. Notably there was an impact, even in this restricted survey, which is supported by prior findings of the impact of chronic disease on oral health.²⁰ The number of people with hepatitis C infection reporting oral pain suggests an impact on the quality of life and this is supported by other studies²¹ where lethargy and pain have been significant problems associated with hepatitis C infection.

The results from this study suggest that routine delivery of dental care for people with hepatitis C infection who are eligible for treatment in public dental clinics will be unacceptable due to the lengthy waiting lists. Figures 4 and 5, panoramic radiographs taken five years apart of the same patient, reveal the dental destruction that can occur as a result of being placed on a waiting list for dental treatment. Those subjects not eligible for public treatment will also

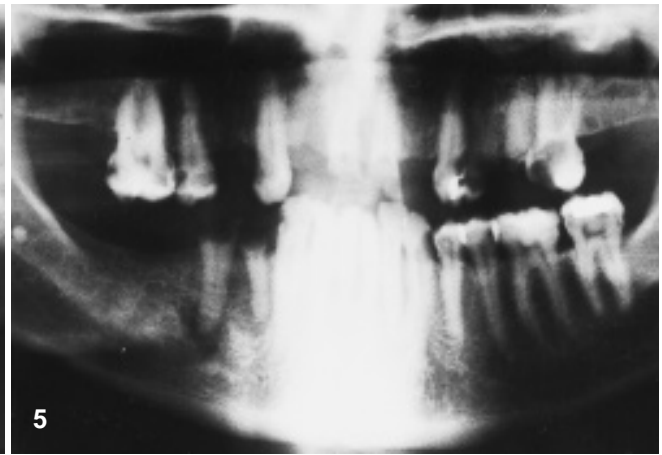
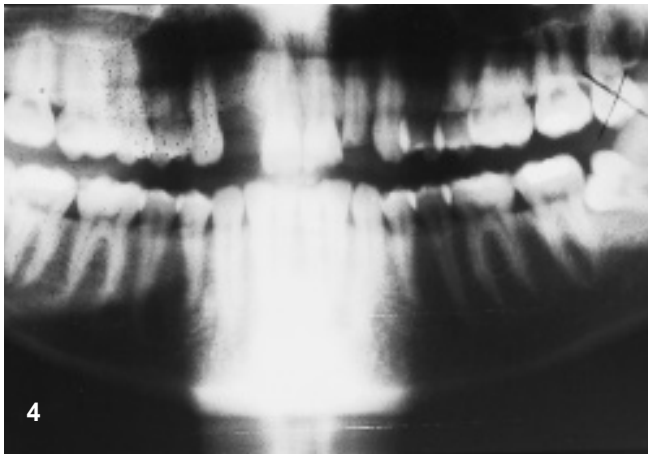


Fig. 4. – Panoramic radiograph taken in 1993 of a 26 year old patient with hepatitis C infection.

Fig. 5. – Panoramic radiograph taken of the patient in Fig. 4 in 1998, demonstrating extreme dental destruction as a result of being placed on waiting lists for treatment.

find the cost burden of dental treatment overwhelming because of the extent of their dental problems. The benefit of having good oral health will provide an improved response to medical and social care and a greater chance of employment. The cost benefit to the community of providing priority dental care for people with hepatitis C infection would consequently be significant.

Photographic records have been taken of subjects to monitor the success of programmes that have been implemented. Obviously, the longitudinal study of oral treatment needs and evaluation of implemented programmes will depend on recognition of the need for priority dental care for people with hepatitis C infection. To achieve this outcome it will be necessary for a demand for oral care from the affected community and for oral health to be incorporated into government strategy on management of hepatitis C infection.

Conclusions

The preliminary results from this pilot project to assess the oral health requirements of people infected with hepatitis C strongly indicate an urgent need for priority delivery of dental care for this group. Dental treatment needs to incorporate a strong preventive programme and oral health education component in order to sustain health improvement. There is a significant alteration in salivary flow, a factor likely to result in oral disease.

Oral disease of extensive proportions has been found in people with hepatitis C infection. Considering the estimated large numbers of people infected with hepatitis C, this could pose a public health concern and these issues need to be raised with various government agencies and hepatitis C support networks.

Further, issues of infection control, prevention of disease transmission, and the broader health

implications of providing dental treatment for people with serious liver dysfunction, will need to be well understood by the dental profession.

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