

## Original Research

### **“TO EVALUATE THE KNOWLEDGE OF EDENTULOUS PATIENTS ABOUT DENTAL HYGIENE, CARE OF PROSTHESES AND AWARENESS OF IMPLANT SUPPORTED OVERDENTURES WITH RESPECT TO GENDER, AGE OF PATIENT AND AGE OF PROSTHESES IN THE POPULATION OF HIMACHAL PRADESH: A CROSS-SECTIONAL STUDY”**

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#### **ABSTRACT:**

It is estimated that 7% to 69% of adult populations internationally are affected with complete edentulism, which is defined as the loss of all permanent teeth. Continued growth in the population strongly suggests that edentulism rates will remain constant or increase over the next few decades.<sup>1</sup> Improving edentulous patients' health by restoring functioning is one of the key goals of rehabilitation therapy. Correct total denture use allows for this. As a result, patients should take great care to use and maintain their prostheses properly, not just for cosmetic and functional reasons but also to ensure the prosthesis' overall health<sup>2</sup>. Cleaning dentures is a challenge for many people who wear them. In our research, oral care habits (like removal of prostheses at night, storage in water) among the population of Himachal Pradesh showed overall good hygiene maintenance of participants below the age of 50 years compared to subjects above 50 years.

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#### **INTRODUCTION**

It is estimated that 7% to 69% of adult populations internationally are affected with complete edentulism, which is defined as the loss of all permanent teeth. Continued growth in the population strongly suggests that edentulism rates will remain constant or increase over the next few decades.<sup>1</sup> Improving edentulous patients' health by restoring functioning is one of the key goals of rehabilitation therapy. Correct total denture use allows for this. As a result, patients should take great care to use and maintain their prostheses properly, not just for cosmetic and functional reasons but also to ensure the prosthesis' overall health<sup>2</sup>. Cleaning dentures is a challenge for many people who wear them. In Edinburgh's residential institutions, Ettinger and Manderson discovered that 65% of senior denture wearers had stains, calculus, or soft debris on their dentures<sup>3</sup>. According to the literature, patients frequently complain that they are not provided instructions on how to maintain their dentures and take care of their oral health in general, as well as the importance of scheduling regular dental appointments<sup>1</sup>. Because removable dentures are similarly susceptible to plaque buildup, maintaining good dental hygiene should be a lifelong endeavour<sup>5</sup>. 3 factors involved in maintenance of healthy edentulous oral tissue are: adequate tissue rest, proper denture hygiene and the cleansing of oral tissues<sup>6</sup>. Dental implants are associated with improved denture

retention, stability, functional efficiency, and quality of life<sup>7</sup>. Both the public awareness and acceptance of dental implants are well increasing<sup>8</sup>.

A variety of elements contribute to effective mastication. One of them is maintaining oral prosthetics and practising good oral hygiene. Another significant indicator of masticatory performance in people with natural dentition was determined to be the portion of occlusal area, or food platform area, on which efficient mastication can occur<sup>9</sup>. In a strictly limited sense, oral hygiene is the practice by the individual of keeping his mouth clean<sup>10</sup>. However, cultures and smears have shown that denture plaque from individuals with denture stomatitis contains a considerably higher proportion of *Candida* species, and the lesions typically healed after topical treatment with particular antimycotic medications<sup>11</sup>. Denture wearing is associated with various acute and chronic reactions of oral mucosa unless oral cavity has good hygiene<sup>12</sup>. There are some methods of using denture cleansers that require periods of soaking of the dentures in the cleansers, but these are recommended for the purpose of cleaning rather than preventing dimensional change.<sup>13</sup> Mechanical plaque control and appropriate denture-wearing habits are the most important measures in prevention and treatment of the disease.<sup>14</sup>

## REVIEW OF LITERATURE

**Manly R S, Vinton P (1951)**<sup>9</sup> conducted a survey and concluded that maintaining oral hygiene is an important factor for good masticatory efficiency. **Tuckfield W J, Harris R (1965)**<sup>10</sup> pointed out that oral hygiene is of major importance and that all evidence suggested that teeth must be subjected to a careful regimen of oral hygiene and diet if they are to be preserved. **Bastiaan R J (1976)**<sup>15</sup> studied on aetiological factors and treatment of denture sore mouth and summarized that most common cause of denture stomatitis being unstable traumatogenic dentures followed by wearing dentures both day and night and poor denture cleanliness. **Bauman R (1977)**<sup>17</sup> quoted that inflammatory papillary hyperplasia has been linked repeatedly to constant wearing of the maxillary denture as well as to poor oral hygiene and added that inadequate home care can seriously compromise the clinical results obtained from even the most meticulous denture technique. **Altman M D, Yost K G, Pitts G (1979)**<sup>19</sup> did a spectrometric protein assay of plaque on dentures and of denture cleaning efficacy and concluded that the high-pH, chlorine-containing cleanser was considerably more efficacious than the neutral-pH peroxy formulation. **Ghalichebaf M, Graser G N, Zander H A (1982)**<sup>20</sup> analyzed the effectiveness of four commercial immersion type cleansers and concluded that both physical action and chemical dissolution are necessary together to remove denture plaque and added that dilute acid cleansers are hazardous and a 15-minute immersion period with enzyme-based cleansers like chlorhexidine gluconate was more readily accepted by patients than overnight immersion. **Goll G, Smith D E, Plein J B (1983)**<sup>22</sup> studied on the effect of denture cleansers on temporary soft liners and the results were indicating that gross changes occur when liners are placed in certain cleansers and it is suggested to test the effects of cleansers on liners. **Tarbet W J, Axelrod S, Minkoff S, Fratarcangelon P A (1984)**<sup>23</sup> conducted a research to quantify the effectiveness of two regimens in removal of accumulated plaque from all surfaces of the denture and concluded that paste or brushing method was consistently the more effective procedure for removal of denture plaque and added that bleaching effects of the effervescent tablets could be useful in an overall denture hygiene program. **Frank R M, Steuer P (1985)**<sup>24</sup> stated from their study on transmission electron microscopy of plaque accumulations in denture stomatitis that the frequency of denture stomatitis is high: 44% according to Bergman et al and 67% according to Love et al with majority of cases reported with comparatively less oral hygiene and inability to clean dentures for patients with manual dexterity. **Stafford G D, Arendorf T, Huggett R (1986)**<sup>13</sup> studied on the effect of overnight drying and water immersion on candidal colonization and properties of complete dentures and suggested that when treating denture stomatitis the regime of allowing the maxillary denture to dry overnight could be used as a simple adjunct to treatment regimes. **Raab F J, Taylor C A, Bucher J A, Mann B L (1991)**<sup>25</sup> examined dentures of patients in the locality of Ohio, Veteran's Affairs Medical Centre, Dayton and validated the superiority of ultrasonic method of cleaning dentures and stated that the ultrasonic cleaning technique offers a rapid, inexpensive, effortless method of cleaning dentures for the handicapped patients, such as those who are debilitated by strokes, lack the physical dexterity to clean their dentures properly. **Odman P (1992)**<sup>26</sup> quoted about the conclusion of a study on effectiveness of enzyme containing denture cleansers for a 3week period that soaking the denture in enzyme cleansers alone was as effective as the patients' previous denture hygiene but that when soaking was combined with brushing, the denture became significantly cleaner. **Lombardi T and Budtz-Jorgensen (1993)**<sup>14</sup> reviewed on problems, diagnosis and treatment associated with complete denture wearers and concluded that old complete dentures may predispose patients to denture stomatitis, because the denture surface may contain porosities that make proper cleaning difficult. **Demers M, Bourdages J, Brodeur J M, Benigeri M (1996)**<sup>29</sup> concluded from their study on indicators of masticatory performance among elderly complete denture wearers that a simple questionnaire on perceived chewing difficulty could be a valuable tool for assessing chewing difficulties related to poor fit of dentures. **Jeganathan S, Payne J A, Thean H P Y (1997)**<sup>30</sup> did a study to assess the relationship between denture age, denture hygiene habits, denture wearing and denture cleanliness in an elderly edentulous Asian population consisting of seventy five edentulous patients and concluded that denture hygiene habits, denture wearing habits and denture cleanliness are factors that showed significant differences between denture stomatitis and control

groups and no differences were observed when the age of subjects and age of dentures were compared. **Nevalainen M J, Narhi T O, Ainamo A (1997)**<sup>32</sup> conducted a large epidemiological health investigation with many aims one of which is to estimate the implications of oral hygiene habits for the existence of mucosal lesions among the study population and concluded that mucosal cleaning showed a significant association with the presence of mucosal lesions and mechanical cleaning should be combined with the use of effective chemical aids. **Papas A S, Palmer C A, Rounds M C, Russell R M (1998)**<sup>33</sup> studied on the effects of denture status on nutrition and concluded that in older populations, there was a significant difference in nutritional status related to whether the individual had a partial or full denture, and that difference was more evident in males than in females and those who wore dentures had more chewing problems and had a higher mortality after six years than the dentate group. **Tanoue N, Matsumura H, Atsuta M (2000)**<sup>34</sup> studied on wear and surface roughness of prostheses after toothbrush/dentifrice abrasion and concluded that mechanical methods, such as toothbrushes, are recommended for routine cleaning and added that they may lead to surface abrasion, which is undesirable for aesthetic and biological reasons, and in addition, mechanical methods are not normally sufficient to remove the micro-organisms that colonise resinous materials. **Naert I, Koutsikakis G, Quirynen M, Duyck J, van Steenberghe D, Jacobs R.15 (2002)**<sup>35</sup> conducted a survey in 660 patients (248 males) aged between 15 and 83years (mean 50) placing implants in the University Hospitals of the Catholic University, Leuven and concluded that based on marginal bone level evolution, oral implants in both jaws and anterior and posterior areas, supporting either single crowns or fixed partial prostheses, have an excellent prognosis up to 16years. **Ortman L F (2004)**<sup>6</sup> pointed out that the three factors involved in maintenance of healthy edentulous oral tissue are adequate tissue rest, proper denture hygiene, and the cleansing of oral tissues which is required for maintaining the health of oral tissues. **Jivraj S and Chee W (2006)**<sup>37</sup> stated that implant retained restorations provide considerable advantages over removable partial dentures which includes improved support, a more stable occlusion, preservation of bone and simplification of the prosthesis which are few reasons why implants are the treatment of choice for missing posterior teeth. **Ortman L F (2004)**<sup>6</sup> pointed out that the three factors involved in maintenance of healthy edentulous oral tissue are adequate tissue rest, proper denture hygiene, and the cleansing of oral tissues which is required for maintaining the health of oral tissues. **Jivraj S and Chee W (2006)**<sup>37</sup> stated that implant retained restorations provide considerable advantages over removable partial dentures which includes improved support, a more stable occlusion, preservation of bone and simplification of the prosthesis which are few reasons why implants are the treatment of choice for missing posterior teeth.

## MATERIALS AND METHODS

### The study was carried out in the following manner:

A **questionnaire** which sought patient's awareness and knowledge of oral and denture hygiene in complete denture prosthesis had been developed similar to a study conducted previously. All patients were comfortably seated on the dental chair, and the questions were asked in Hindi / English. Patients were encouraged to give frank opinion about his/her denture and were assured that their identity will be kept confidential. The questionnaire's design was based on previous studies and the questions are very simple. It was tested and evaluated in a pilot study. The results of the pilot study were evaluated and no alterations appeared necessary. All patients received an extensive questionnaire and accompanying instructions. The survey was presented as a confidential inquiry into patients' satisfaction with dentures. The starting point for the questionnaire was inquiries related to sociodemographic factors which included name, age, sex, education and time of denture usage. The starting point for the questionnaire was inquiries related to sociodemographic factors which included name, age, sex, education, and profession. Questions were framed on oral hygiene measures, cleaning frequencies and cleaning aids used, prostheses' use, awareness and preference for implant overdentures.

**Study Design:** Cross-sectional epidemiologic study

**Study Area:** Demographic profile of Himachal Pradesh

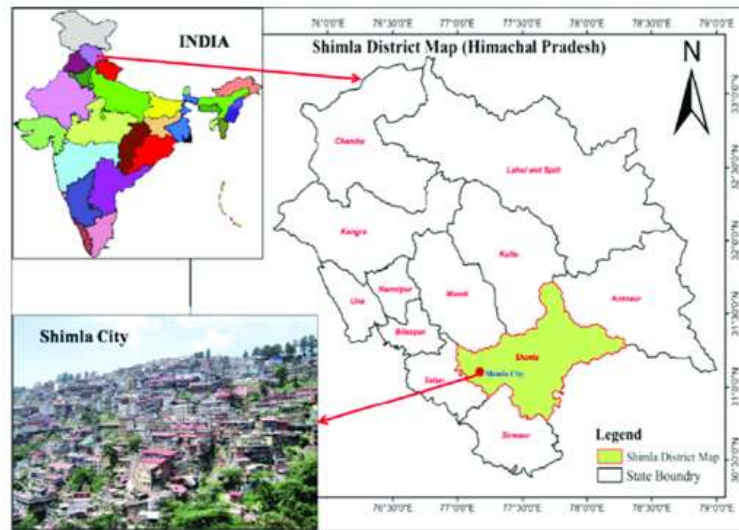
**Study Period:** August 2021-August 2022

**Ethical approval for the study:** Ethical approval to conduct the study was obtained from the Institutional Ethical committee of H.P. Govt. Dental College and Hospital, Shimla.

### Selection criteria:

Inclusion Criteria	Exclusion Criteria
The patients who received complete denture prostheses earlier and experienced users from the department were included in the study	Those who are suffering from Oral Submucous Fibrosis (OSMF), Temporomandibular Joint (TMJ) dysfunction, neurological disorders, psychological defect and patients with extremely resorbed ridge were excluded.
Patients who were treated from the state of Himachal Pradesh	Patient with removable partial denture prostheses.
Patients with good physical and mental health	Patient with fixed partial dentures.
Patients who were able to answer the questions	Patient who are physically or mentally challenged.

**Statistical analysis:** Data were entered into Microsoft Excel spreadsheet and then checked for any missing entries. All the data was analysed using the IBM Statistical Package for Social Sciences (SPSS) for Windows, Version 21.



**Map 1:** Map of India showing the location of state of Himachal Pradesh

**Overall** majority of the subjects 84 (84%) responded with “removal at night” followed by “sleeping with dentures” consisting of 16 subjects (16%). The gender-wise differences when assessed using Chi square test, were not found to be statistically significant, i.e. p value 0.3 which is statistically insignificant. The age-wise differences were statistically significant (p 0.027). The prostheses age-wise differences was also insignificant (p 0.4).

On questioning “How do you store your dentures?”, the data from this study showed the following results: Among gender distribution, 48 males (94.12%) and 33 females (100%) responded “In water” and 3 males (5.88%) and 0 females (0%) responded “Dry storage”. Among age distribution, the subjects who responded “In water” below the age of 50 years constituted for 27 (93.10%) and those above 50 years of age was 54 (98.18%). Those who responded “Dry storage” below the age of 50 years constituted for 2 (6.90%) and those above the age of 50 years was 1 (1.82%). Among age of prostheses category, the subjects using prostheses less than 1 year who used to sleep with prostheses were 5 (13.89%) and those wearing prostheses for more than 1-5 years were 11 (17.19%). The subjects who removed prostheses at night with age of prostheses being less than 1 year were 31 (86.11%) and those whose age of prostheses were above 1-5 years were 53 (82.81%). **Overall** subjects responding with “In water” were 81 (96.43%) and “Dry storage” were 3 (3.57%) with p value 0.04 which is **statistically significant** (p<0.05)

On questioning “Do you clean your dentures daily?”, the data from this study showed the following results; Among gender distribution, 55 males (94.83%) and 41 females (97.62%) responded “Yes” and 3 males (5.17%) and 1 female (2.38%) responded “No”. Among age distribution, the subjects who responded “Yes” below the age of 50 years constituted for 36 (94.74%) and those above 50 years of age was 60 (96.77%). Those who responded “No” below the age of 50 years constituted for 2 (5.26%) and those above the age of 50 years was 2 (3.23%). Among age of prostheses category, the subjects who responded “Yes” with age of prostheses less than 1 year were 33 (91.67%) and those wearing prostheses for more than 1-5 years were 63 (98.44%). The subjects who responded “No” with age of prostheses being less than 1 year were 3 (8.33%) and those whose age of prostheses were above 1-5 years were 1 (1.56%). **Overall** subjects responding with “Yes” were 96 (96%) and “No” were 4 (4%) with p value 0.03 which is **statistically significant** (p<0.05)

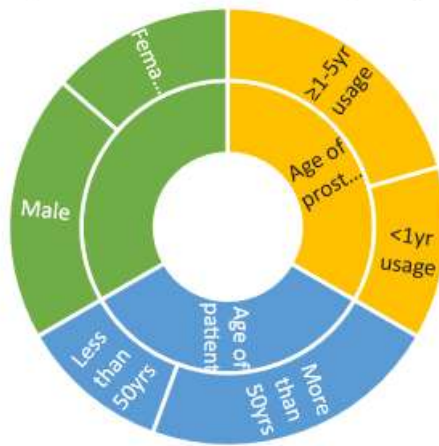
Upon questioning, “How many times a day do you clean it?”, the data from this study showed the following results;

Among gender distribution, 55 males (94.83%) and 41 females (97.62%) responded “Yes” and 3 males (5.17%) and 1 female (2.38%) responded “No”. Among age distribution, the subjects who responded “Yes” below the age of 50 years constituted for 36 (94.74%) and those above 50 years of age was 60 (96.77%). Those who responded “No” below the age of 50 years constituted for 2 (5.26%) and those above the age of 50 years was 2 (3.23%). Among age of prostheses category, the subjects who responded “Yes” with age of prostheses less than 1 year were 33 (91.67%) and those wearing prostheses for more than 1-5 years were 63 (98.44%). The subjects who responded “No” with age of prostheses being less than 1 year were 3 (8.33%) and those whose age of prostheses were above 1-5 years were 1 (1.56%). **Overall** subjects responding with “Yes” were 96 (96%) and “No” were 4 (4%) with p value 0.03 which is **statistically significant** (p<0.05).

<u>PROFORMA TO BE FILLED BY PATIENTS/GUARDIANS</u>	
1. Name: _____	
2. Age/Gender: _____	
3. Education: _____	
4. Occupation: _____	
5. How long have you been using these dentures?	
1 year or less	1
to 5yrs or more	
6. Do you sleep with your dentures?	
Yes	No
6.1. Do you remove your dentures at some point during the day?	
Yes	No
6.2. How do you store your dentures?	
In water	Dry storage
7. Do you clean your dentures daily?	
Yes	No
7.1. How many times a day do you clean it?	
Once a day	Twice a day
Three times	Over three times a day
8. How do you clean it? Using only:	
Water	Toothbrush
Toothpaste	Combination
of all	Others: _____
10. Do you feel that your prosthesis restricts what you can eat?	
Yes	No
11. How long could a patient use a complete denture prosthesis?	
5 years or less	5-10 years
More than 10 years	It depends on patient care
12. Do you think care of dentures increases its longevity?	
Yes	No
13. Are you aware of implant overdentures?	
Yes	No
13.1 If yes, how do you know? Through	
Dentist	Family/Friends
13.2 Do you think implant supported overdentures are also as effective as natural dentition?	
Yes	No
14. If given an option for implant supported overdenture, will you opt for it?	
Yes	No
14.1 If not, what is the reason?	
Cost	Not willing for surgery
Time consuming	Fear of longevity
Others: _____	

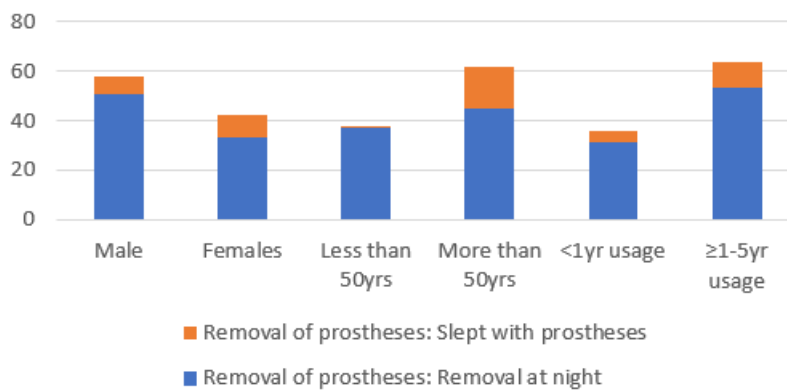
Fig.1 Questionnaire proforma used for the study

Graph 1. Distribution of study subjects



Gender	Age of patient	Age of prostheses		Total
		Less than 1 year	Equal to or more than 1-5 years	
Males	<50yrs	8	10	18
	>50yrs	9	31	40
Females	<50yrs	9	11	20
	>50yrs	10	12	22
<b>Total</b>		<b>36</b>	<b>64</b>	<b>100</b>

Graph 2. Assessment of oral hygiene habits



Graph 3. Cleaning prostheses

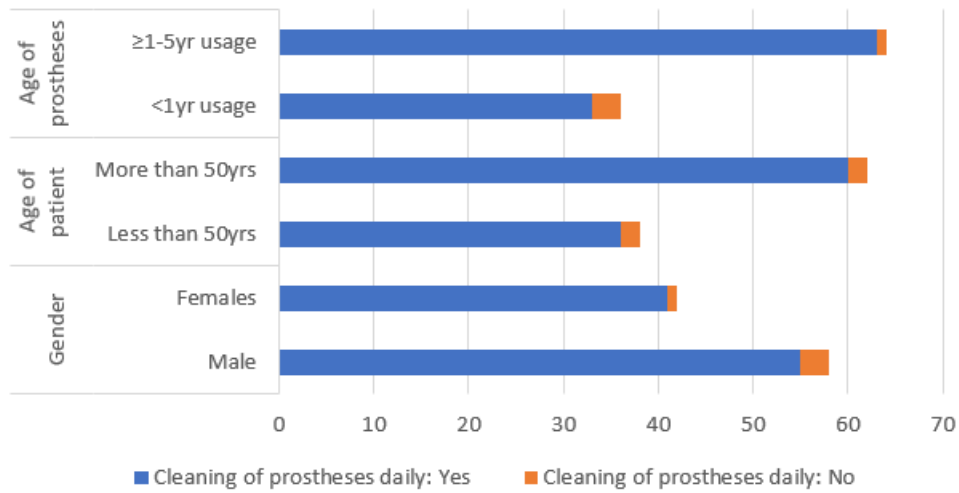


Table 2. Cleaning frequencies

Age of prostheses use	Gender			How many times a day do you clean it?				Total
				1	2	3	More than 3	
				Age of patient				
1 year and less	Male	Age of patient	<50years	1	2	6	1	10
			>50years	1	1	5	1	8
	Female	Age of patient	<50years	0	1	6	1	8
			>50years	0	1	9	0	10
	Overall	Age of patient	<50years	1	3	12	2	18
			>50years	1	2	15	1	18
Equal to or more than 1-5 years	Male	Age of patient	<50years	0	0	7	1	7
			>50years	1	6	23	2	32
	Female	Age of patient	<50years	0	1	6	6	13
			>50years	2	1	8	1	12
	Overall	Age of patient	<50years	0	1	13	6	20
			>50years	3	7	31	3	44
<b>Total</b>				<b>5</b>	<b>13</b>	<b>70</b>	<b>12</b>	<b>100</b>

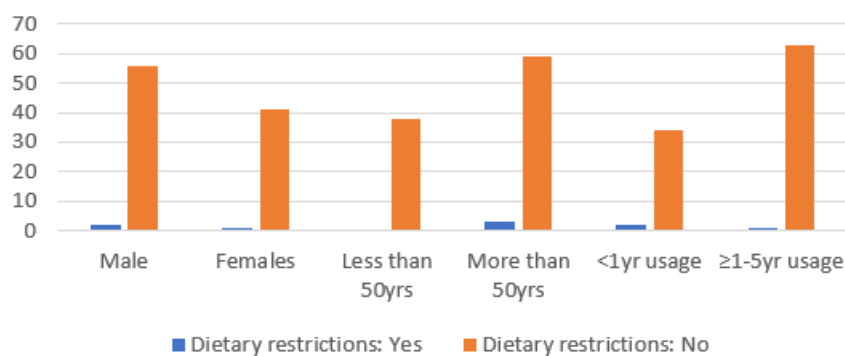
**Table 3. Cleaning methods**

Age of prostheses use	Gender		How do you clean it?									
			1	1,2,4	3	1,4	4	5	2,3	2,4	Tt	
1 year and less	Male	Age of patient	<50yrs	0	0	0	2	0	0	9	0	11
			>50yrs	1	0	0	0	0	0	7	0	8
	Female	Age of patient	<50yrs	0	0	0	0	0	0	7	0	7
			>50yrs	0	0	1	0	0	1	8	0	10
	Overall	Age of patient	<50yrs	0	0	0	2	0	0	16	0	18
			>50yrs	1	0	1	0	0	1	15	0	18
Equal to or more than 1-5 years	Male	Age of patient	<50yrs	0	0	0	0	0	0	6	1	7
			>50yrs	0	0	0	0	1	0	30	1	32
	Female	Age of patient	<50yrs	2	1	2	0	0	0	7	1	13
			>50yrs	0	0	0	0	0	0	11	1	12
	Overall	Age of patient	<50yrs	2	1	2	0	0	0	13	2	20
			>50yrs	0	0	0	0	1	0	41	2	44
<b>Total</b>			<b>3</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>85</b>	<b>4</b>	<b>100</b>	

**Table 4. Use of disinfectants**

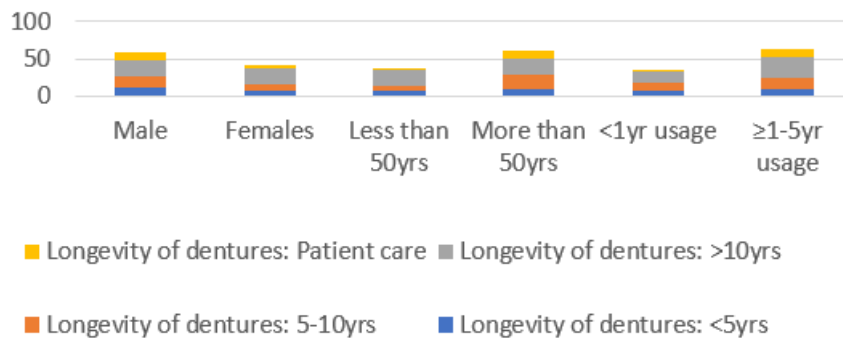
		Do you use any disinfecting substance to help clean your dentures?		Total	p value
		Yes	No		
Gender	Male	2	56	58	0.31
	Females	1	41	42	
	Total	3	97	100	
Age of patient	Less than 50yrs	0	38	38	0.007*
	More than 50yrs	3	59	62	
	Total	3	97	100	
Age of prostheses	<1yr usage	2	34	36	0.19
	≥1-5yr usage	1	63	64	
	Total	3	97	100	

**Graph 4. Dietary restrictions**

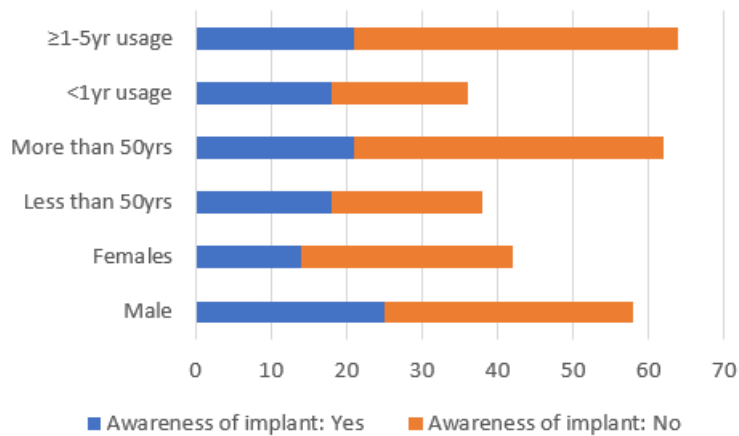




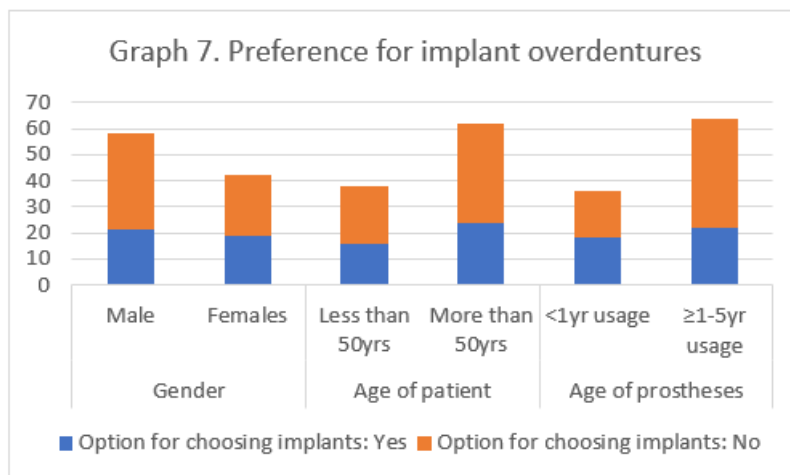
Graph5.Subject's perspective of prostheses longevity

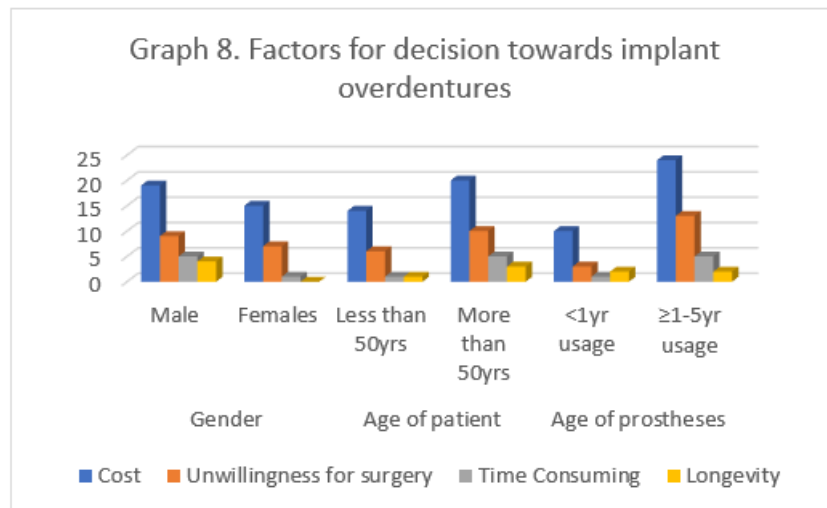


Graph 6.Knowledge of implant overdentures



Graph 7. Preference for implant overdentures





**Table 16. Overall responses of the questionnaire survey**

Qn	Response	N	%	P value
Q 6	No	84	84%	<b>0.035, S</b>
	Yes	16	16%	
Q 6.1	No	16	16%	<b>0.035, S</b>
	Yes	84	84%	
Q 6.2*	Dry storage	3	3.57%	0.065, NS
	Water	81	96.43%	
Q 7	No	4	4%	<b>0.001, S</b>
	Yes	96	96%	
Q 7.1	1	5	5%	<b>0.015, S</b>
	2	13	13%	
	3	70	70%	
	>3	12	12%	
Q 8	<b>Water</b>	<b>13</b>	<b>13%</b>	<b>0.001, S</b>
	<b>Toothbrush</b>	<b>87</b>	<b>87%</b>	

	<i>Toothpaste</i>			
	<i>Soap</i>			
	<i>Combination of all</i>			
Q 9	No	97	97%	<b>0.001, S</b>
	Yes	3	3%	
Q 9.1*	Others	0	0%	0.239, NS
	Sodium hypochlorite	3	100%	
Q 10	No	93	93%	0.397, NS
	Yes	7	7%	
Q 11	Less than 5yrs	17	17%	0.241, NS
	5-10yrs	25	25%	
	More than 10yrs	44	44%	
	Depends on patient care	14	14%	
Q 12	No	15	15%	
	Yes	85	85%	
Q 13	No	61	61%	<b>0.04, S</b>
	Yes	39	39%	
Q 13.1*	Dentist	33	84.62%	0.899, NS
	Family/friends	6	15.38%	
Q 13.2	No	90	90%	0.244, NS
	Yes	10	10%	
Q 14	No	60	60%	<b>0.001, S</b>
	Yes	40	40%	

Q 14.1*	Cost	34	56.67%	<b>0.035, S</b>
	Unwillingness for surgery	16	26.67%	
	Time consuming	6	10%	
	Longevity	4	6.67%	

Upon questioning, "How do you clean it?", the data from this study showed the following results; Among gender distribution, 1 male (1.72%) and 2 females (4.76%) responded "Water"; 0 males (0%) and 1 female (2.38%) selected a combination of "Water", "Toothpaste", "Soap"; 2 males (3.45%) and 0 females (0%) responded a combination of "Water" and "Soap"; 52 males (89.65%) and 33 females (78.57%) selected "Toothbrush" and "Toothpaste"; 2 males (3.44%) and 2 females (4.76%) responded a combination of "Toothbrush" and "Soap"; 0 males (0%) and 3 females (7.14%) responded "Toothpaste"; 1 male (1.72%) and 0 females (0%) selected "Soap"; 0 males (0%) and 1 female (2.38%) responded "Combination of all". Among age distribution, subjects less than 50 years selecting "Water" were 2 (5.26%) and subjects above age 50 years were 1 (1.61%); subjects less than age 50 years selecting "Water", "Toothbrush", "Soap" were 1 (2.63%) and subjects more than age 50 years were 0 (0%); subjects less than 50 years selecting "Water", "Soap" were 2 (5.26%) and subjects above 50 years were 0 (0%); 29 subjects (76.31%) less than 50 years and 56 subjects (90.32%) above 50 years "Toothbrush" and "Toothpaste"; 2 subjects (5.26%) less than 50 years and 2 subjects (3.22%) above 50 years responded "Toothbrush" and "Soap"; 2 subjects (5.26%) less than 50 years and 1 subject (1.61%) more than 50 years responded "Toothpaste"; 0 subjects (0%) less than 50 years and 1 subject (1.61%) more than 50 years selected "Soap"; 0 subjects (0%) less than 50 years and 1 subject (1.62%) more than 50 years responded "Combination of all". Among age of prostheses category, subjects using prostheses less than 1 year selecting "Water" were 1 (2.77%) and subjects with prostheses above 1-5 years were 2 (3.12%); subjects using prostheses less than 1 year selecting "Water", "Toothbrush", "Soap" were 0 (0%) and subjects using prostheses more than age 1-5 years were 1 (1.56%); subjects wearing prostheses less than 50 years selecting "Water", "Soap" were 2 (5.56%) and subjects with prostheses above 1-5 years were 0 (0%); 31 subjects (86.11%) with prostheses less than 1 year and 54 subjects (84.37%) above prostheses 1-5 years "Toothbrush" and "Toothpaste"; 0 subjects (0%) using prostheses less than 1 year and 4 subjects (6.25%) using prostheses more than 1-5 years responded "Toothbrush" and "Soap"; 1 subjects (2.77%) using prostheses less than 1 year and 2 subject (3.12%) using prostheses more than 1-5 years responded "Toothpaste"; 0 subjects (0%) with prostheses less than 1 year and 1 subject (1.56%) using prostheses more than 1-5 years selected "Soap"; 1 subjects (2.77%) using prostheses less than 1 year and 0 subject (0%) with prostheses more than 1-5 years responded "Combination of all". **Overall** majority of subjects responded with "Toothbrush" were 90 (90%) followed by "Toothpaste" were 88 (88%) with p value 0.04 which is **statistically significant** ( $p < 0.05$ ).

Upon questioning, "Do you use any disinfecting substance to help clean your dentures?", the data from this study showed the following results;

Among gender distribution, 2 males (3.45%) and 1 female (2.38%) responded "Yes" and 56 males (96.55%) and 41 females (97.62%) responded "No". Among age distribution, the subjects who responded "Yes" below the age of 50 years constituted for 0 (0%) and those above 50 years of age was 3 (4.84%). Those who responded "No" below the age of 50 years constituted for 38 (100%) and those above the age of 50 years was 59 (95.16%). Among age of prostheses category, the subjects who responded "Yes" with age of prostheses less than 1 year were 2 (5.56%) and those wearing prostheses for more than 1-5 years were 1 (1.56%). The subjects who responded "No" with age of prostheses being less than 1 year were 34 (94.44%) and those whose age of prostheses were above 1-5 years were 63 (98.44%). **Overall** subjects responding with "Yes" were 3 (3%) and "No" were 97 (97%) with p value 0.19 which is statistically insignificant ( $p < 0.05$ ).

Upon questioning, "Do you feel that your prosthesis restricts what you can eat?", the data from this study showed the following results;

Among gender distribution, 2 males (3.45%) and 5 female (11.90%) responded "Yes" and 56 males (96.55%) and 37 females (88.10%) responded "No". Among age distribution, the subjects who responded "Yes" below the age of 50 years constituted for 2 (5.26%) and those above 50 years of age was 5 (8.06%). Those who responded "No" below the age of 50 years constituted for 36 (94.74%) and those above the age of 50 years was 57 (91.94%). Among age of prostheses category, the subjects who responded "Yes" with age of prostheses less than 1 year were 0 (0%) and those wearing prostheses for more than 1-5 years were 7 (10.94%). The subjects who responded "No"

with age of prostheses being less than 1 year were 36 (100%) and those whose age of prostheses were above 1-5 years were 57 (89.06%). **Overall** subjects responding with “Yes” were 7 (7%) and “No” were 93 (93%) with p value 0.012 which is **statistically significant** ( $p < 0.05$ ).

Upon questioning, “How long could a patient use a complete denture prosthesis?”, the data from this study showed the following results;

Among gender distribution, 11 males (18.96%) and 6 female (14.28%) responded “5 years or less” & 16 males (27.58%) and 9 females (21.42%) responded “5-10 years”, 2 males (37.93%) and 22 females (52.38%) responded “More than 10 years” and 9 males (15.52%) and 5 females (11.91%) selected “Depends on patient care”. Among age distribution, the subjects who responded “Less than 5 years” below the age of 50 years constituted for 7 (18.42%) and those above 50 years of age was 10 (16.12%). Those who responded “5-10 years” below the age of 50 years constituted for 6 (15.78%) and those above the age of 50 years was 19 (30.64%). The subjects responding “More than 10 years” below the age of 50 years were 23 (60.52%) and above the age of 50 years were 21 (33.87%) . Only 2 of the subjects (5.27%) below the age of 50 years and 12 subjects (19.35%) above the age of 50 years responded “Depends on patient care”. Among age of prostheses category, 7 subjects (19.44%) less than 1 year of prostheses’ use and 10 subjects (15.63%) more than 1-5 years’ of prostheses’ use responded “5 years or less” and 10 subjects (27.78%) less than 1 year of prostheses’ use and 15 subjects (23.43%) more than 1-5 years of prostheses’ use responded “5-10 years”, 16 subjects (44.44%) less than 1 year of prostheses’ use and 28 subjects (43.75%) more than 1-5 years of prostheses’ use responded “More than 10 years” and 3 subjects (8.33%) less than 1 year of prostheses’ use and 11 subjects (17.18%) of prostheses’ use more than 1-5 years responded “Depends on patient care”. **Overall** majority of subjects responded with “More than 10 years” followed by “5-10 years”, followed by “Less than 5 years” and lastly “Depends on patient’s care” with p value 0.244 which is statistically insignificant ( $p > 0.05$ ).

Upon questioning, “Are you aware of implant overdentures?”, the data from this study showed the following results;

Among gender distribution, 25 males (43.10%) and 14 female (33.33%) responded “Yes” and 33 males (56.90%) and 28 females (66.67%) responded “No”. Among age distribution, the subjects who responded “Yes” below the age of 50 years constituted for 18 (47.37%) and those above 50 years of age was 21 (33.87%). Those who responded “No” below the age of 50 years constituted for 20 (52.63%) and those above the age of 50 years was 41 (66.13%). Among age of prostheses category, the subjects who responded “Yes” with age of prostheses less than 1 year were 18 (44.44%) and those wearing prostheses for more than 1-5 years were 21 (35.94%). The subjects who responded “No” with age of prostheses being less than 1 year were 20 (55.56%) and those whose age of prostheses were above 1-5 years were 41 (64.06%). **Overall** subjects responding with “Yes” were 7 (7%) and “No” were 93 (93%) with p value 0.31 which is statistically insignificant ( $p > 0.05$ ).

Upon questioning, “If given an option for implant supported overdenture, will you opt for it?”, the data from this study showed the following results;

Among gender distribution, 21 males (36.21%) and 19 female (45.24%) responded “Yes” and 37 males (63.79%) and 23 females (54.76%) responded “No”. Among age distribution, the subjects who responded “Yes” below the age of 50 years constituted for 16 (42.11%) and those above 50 years of age was 24 (38.71%). Those who responded “No” below the age of 50 years constituted for 22 (57.89%) and those above the age of 50 years was 38 (61.29%). Among age of prostheses category, the subjects who responded “Yes” with age of prostheses less than 1 year were 20 (55.56%) and those wearing prostheses for more than 1-5 years were 20 (31.25%). The subjects who responded “No” with age of prostheses being less than 1 year were 16 (44.44%) and those whose age of prostheses were above 1-5 years were 44 (68.75%). **Overall** subjects responding with “Yes” were 7 (7%) and “No” were 93 (93%) with p value 0.241 which is statistically insignificant ( $p > 0.05$ ).

Upon questioning, “If not, what is the reason?”, among the study subjects who responded “No” from the previous question, the data from the current investigation showed the following results;

Among gender distribution, 19 males (34.5%) and 15 female (23.8%) responded “Cost”, 9 males and 7 females responded “Not willing for surgery”, 5 males and 1 female selected “Time consuming” and 4 males (96.55%) and 0 females (97.62%) responded “Fear of longevity”. Among age distribution, the subjects below the age of 50 years for the option “Cost” constituted for 14 (63.63%), “Not willing for surgery” constituted for 6 (27.27%), “Time consuming” constituted for 1 (4.55%) and “Fear of longevity” constituted for 1 (4.55%) and among those above 50 years of age selecting the option “Cost” were 20 (52.63%), “Not willing for surgery” were 10 (26.32%), “Time consuming” were 5 (13.16%) and “Fear of longevity” were 3 (7.89%). Among age of prostheses category, the subjects with age of prostheses being less than 1 year, who responded “Cost” were 10 (62.5%), those selecting “Not willing for surgery” being 3 (18.75%), those responding “Time consuming” being 1 (5.25%) and those selecting “Fear of longevity” were 2 (12.5%). Among those whose age of prostheses were above 1-5 years, responding “Cost” were 24 (54.55%), followed by “Not willing for surgery” being 13 (29.55%), those selecting “Time consuming” being 5 (11.36%) and those responding “Fear of longevity” were 2 (4.54%). **Overall** majority of the subjects responded with “Cost” (56.67%) followed by “Not willing for surgery” (26.66%), followed by

“Time consuming” (10%) and lastly “Fear of longevity” (6.67%) with p value 0.087 which is statistically insignificant ( $p > 0.05$ ).

The overall responses were then tabulated.

## DISCUSSION

“Cleanliness is next to Godliness” is one of the well-known proverbs and everyone likes when one keeps oneself clean inside-out. Dental treatments are successful if and only one takes care of one’s oral hygiene whatever kind of treatment may it be. One of the main objectives of rehabilitation therapy is to enhance the functioning of edentulous patients in order to improve their health. In order to protect the prosthesis' general health as well as its aesthetic and functional qualities, patients should take great care to use and maintain their prostheses properly<sup>2</sup>. Himachal Pradesh has more than 7 lakh persons aged in the category of elderly, constituting 10.2% of its total population, which is higher than the national average of 8.6% as of Census 2011 (since Census 2021 was postponed to 2023 because of COVID-19). Clinical studies have shown that control of denture plaque is essential to obtain and maintain a healthy oral mucosa in denture wearers.<sup>19</sup>

**The first aim of the study was to analyze denture users’ oral care habits and hygiene with regard to the use of their prostheses.** In response to the question number 6: “Do you sleep with your dentures?”, majority of the study subjects (84%) responded negatively and do not sleep wearing the dentures in accordance to the study conducted by Barbosa L C<sup>2</sup>. In response to the question number 6.2: “How do you store your dentures?”, the subjects responding placing the prostheses in water were around 81(96.43%) which is in accordance with the study conducted by Duyck J et al<sup>48</sup>. Another study by Bacali C et al.<sup>49</sup> showed only 30.9% of the respondents reported denture removal at night.

**The second aim of the study was to analyze the knowledge of denture wearers about cleaning methods.** In response to the question number 7: “Do you clean your dentures daily?”, majority of the study subjects responded positively. 96% of the participants in the study said they cleaned their prostheses every day. These are in agreement with Marchini et al.<sup>41</sup> (98.7% of a sample of 236) and Nevalainen et al.<sup>32</sup> In response to question number 7.1: “How many times a day do you clean it?”, majority of the subjects responded that they used to clean their prostheses around 3 times a day. According to Grant et al<sup>30</sup> research, there is a direct link between poor cleaning and a high Candidal prevalence. It was shown that 62.7% of people cleaned their entire dentures three or more times per day, which is deemed satisfactory. In response to the question number 8: “How do you clean it?”, majority of the study subjects responded using of toothbrush (90%) followed by toothpaste (88%) which is in accordance with the research conducted by Bacali C et al wherein 93.2% were using toothbrush and 76.5% reported using of toothpaste. In response to the question number 9: “Do you use any disinfecting substance to help clean your dentures?”, majority of the answers obtained were negative indicating the lesser knowledge of usage of disinfecting agents like sodium hypochlorite. Only 3% of the population (every of them used sodium hypochlorite) in our current research did use chemical disinfecting substances which is in contrast to the study conducted by Barbosa L C<sup>2</sup> wherein 16.8% of the sample used disinfecting agents.

**The third aim of the study was to educate the patient regarding the oral hygiene.** As a part of the aim, the participants were taught about the cleaning methods, importance of aftercare and oral care measures which should be followed before, during and after complete dentures treatment which affects not only the life of prostheses but also the tissues of oral cavity. The oral care measures were explained orally and also a poster placed at the entrance of the Out-Patient Department. This is in harmony with the research by Arpak M N et al<sup>51</sup> in which oral hygiene measures was orally given and reinforced with written brochures and oral hygiene was rechecked after some days wherein the prostheses maintenance and oral care hygiene measures were satisfactory.

**The last aim of the study was to evaluate the knowledge of complete denture wearers about the implant supported overdentures and to educate them further.** In response to the question number 13: “Are you aware of implant overdentures?”, higher incidence of study subjects had responded negatively (61%) and only 39% of the participants did knew implant overdentures which is similar to research conducted by Antony et al<sup>49</sup> in which 68.4% of the participants knew about implants as a treatment modality. In another research conducted by Chowdhary R et al<sup>46</sup> in which almost 23.24% had heard of oral implants as a treatment modality. In response to the question number 13.1: “If yes, how do you know?” majority of the subjects knew through their dentists (84.62%) which is higher than the study conducted by Antony et al<sup>49</sup> in which 62.4% of the information about implant prostheses was from dentists and another research by Gharpure A S et al<sup>23</sup> wherein 67.49% knew this option through dentists and 8.67% knew through family/friends. In response to the question number 13.2: “Do you think implant supported overdentures are also as effective as natural dentition?”, most of the patients had responded negatively (90%) which is in greater than a study conducted by Gharpure A S et al.<sup>23</sup> in which around 62.85% of subjects felt that implant supported prostheses are not as effective as natural dentition. In response to the question number 14: “If given an option for implant overdenture, will you opt for it”, a higher number of patients were responding negatively 60% and only 40% opted for implant overdenture treatment which is similar to a study conducted by Hosadurga R et al.<sup>48</sup> only 39% of the study subjects were choosing implant as treatment option whereas a total of 450 participants were surveyed. This is in contrast to the study conducted by Gharpure

et al.<sup>23</sup> in which 85.45% of the participants were ready to restore the missing teeth with implant-based treatment options. In response to the question number 14.1: "If not, what is the reason?", majority of the subjects felt that the treatment modality using implants was costly (56.67%), followed by unwillingness towards surgical procedures (26.66%), followed by longer treatment period (10%) and lastly fear towards longevity of the prostheses (6.67%) which was similar to a research conducted by Chowdhary et al<sup>46</sup> wherein 76.76% of the population felt the treatment option costly and wanted dental insurance to cover the cost of the treatment. This is in accordance to the study conducted by Gharpure A S et al<sup>23</sup> in which around 62.85% felt the treatment cost was deciding factor followed by Surgical procedure (19.20%) and lastly long period for treatment completion (17.96%). It was seen that hygiene habits and practices may not always present a positive correlation with the gender, educational level, and income of the subjects. The drawbacks of my study were the lack of access to the target audience due to security concerns and the lower importance of conducting a survey due to more pressing tasks. For example, the problem with not asking users questions face-to-face is that each user may perceive them differently. Results may be skewed if the questionnaire wasn't completely explained to each person and made sure they all understood it. This study was carried out within the institutional setup and only 100 subjects belonging to the population of Himachal Pradesh were evaluated. Hence the result may be applicable to just a small population. The results of the study should be validated by including a large population size spread over the entire Indian subcontinent. This would help to generate multiple factors for various concerns present in the Indian population.

### SUMMARY AND CONCLUSION

"The mouth is the vehicle for communication and for receiving nourishment." The health of the internal environment is reflected by the oral cavity. Further, dental disabilities can affect one's ability or desire to speak or eat publicly and can lead to social isolation.

Population surveys worldwide indicate that increasing number of older adults are retaining their natural teeth into old age.<sup>52</sup> Adequate denture hygiene can prevent and treat infection in edentulous patients.<sup>41</sup> Loss of teeth not only affects facial appearance but also affects a person psychologically. Poor hygiene is associated with the lack of guidance, intrinsic characteristics of dentures and diminished manual dexterity of most of the denture wearers due to old age. For the majority of the edentulous old patients, the provision of conventional complete dentures remains the realistic treatment available, although other alternative treatments offered such as overdentures or implant retained dentures.

The conclusions drawn from this present study were:

1. Oral hygiene habits: In our research, oral care habits (like removal of prostheses at night, storage in water) among the population of Himachal Pradesh showed overall good hygiene maintenance of participants below the age of 50 years compared to subjects above 50 years.
2. Aftercare of prostheses: The aftercare of prostheses among the population of the subjects studied showed that the maintenance procedures of the participants using dentures 1 year or less were better than the subjects using more than 1-5 years.
3. Awareness of implant supported prostheses: Knowledge and awareness of the implant and implant supported prostheses showed more knowledge of the implant overdentures among the participants below the age of 50 years than the participant above the age of 50 years.

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