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Evaluating Patient Experiences and Perceptions in the Diagnosis and Management of Dentine Hypersensitivity: A Cross-Sectional Study

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ABSTRACT

Dentine Hypersensitivity (DH), or sensitive teeth, was a dental pain caused by exposure of dentinal tubules. Understanding patients' experiences and perceptions was crucial for developing effective diagnostic and treatment plans. **Objective:** To investigate the patients' experiences, perceptions, and diagnostic techniques for DH. The research also addresses the therapy approaches to limit dentine hypersensitivity for the better quality of life in patients. **Methods:** A non-probability convenience sampling technique was used to conduct the study for three months, from April 2024 to June 2024, in the University of Lahore's dental hospital and private dental clinics in Lahore. A close-ended questionnaire consisting of 20 items was used for data collection. The relationship between DH, gender, and other variables was examined using a chi-square test; P-value < 0.05 was considered statistically significant. **Results:** The study with 1105 participants found a slightly higher representation of females (51%) than males (49%), with both genders reporting similar rates of tooth pain during food consumption. DH was most prevalent in the 41-60 age group (33.8%), with 74% experiencing pain with certain foods, 88% not receiving professional treatment, and 99% acknowledging DH's significant impact on their quality of life. **Conclusions:** This study highlighted the significant prevalence of DH among adults, substantially impacting their quality of life. The findings emphasize the need for increased awareness, better diagnostic strategies, and patient-centred treatments to manage this condition effectively.

INTRODUCTION

Dentine Hypersensitivity (DH) is a prevalent oral health issue that significantly impacts a large number of people worldwide. DH affects 10%-30% of the global population, affecting 71% of adults. Studies conducted in Europe demonstrated that DH affected 42% of young adults. It is a painful condition, with 30% of adults in the United States experiencing it. Research shows DH is more prevalent among adults, with rates ranging from 25% to 40%. In Pakistan, DH epidemiology has been studied infrequently, with a 22% prevalence reported in Lahore and 36.4% in Karachi [1-3]. One of the major symptoms of DH is intense pain in response to stimuli such as hot, cold, sweet, and acidic foods, or brushing and flossing. This pain is sudden, fleeting, and can be quite uncomfortable. DH is more than just pain; it can interfere with daily activities such as eating, drinking, and maintaining dental hygiene, resulting in decreased quality of life [4]. The hydrodynamic theory suggests that external stimuli like temperature changes or mechanical forces stimulate the pulp-dentine interface's nerve terminals, causing a pain response. Dentinal tubule size, density, and patency affect fluid movement and pain. Extended exposure can make dentine nerve endings more sensitive, exacerbating pain perception. Different inflammatory mediators like prostaglandins, bradykinin,

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and histamine are generated, causing vasodilation, increased vascular permeability, and nerve fiber sensitization, intensifying pain perception and transmission [5, 6]. To manage DH, both non-invasive and invasive methods are used to obstruct dentinal tubules, desensitize nerve endings, and address underlying etiological causes. Research has indicated that there are several methods to strengthen enamel and reduce DH, such as desensitizing toothpaste, fluoride therapy, dental sealants, oxalate-based products, laser therapy, and Amorphous Calcium Phosphate (ACP) products [7, 8]. For tooth sensitivity, initial treatments often include over-the-counter desensitizing toothpastes that contain ingredients like potassium nitrate or stannous fluoride. For cases that don't respond to these methods, in-office treatments such as laser therapy, resin-based sealants, amorphous calcium phosphate products, and professional fluoride applications may be considered [9]. Additionally, lifestyle and behavioral changes, such as educating patients on proper oral hygiene, avoiding acidic foods and drinks, quitting smoking, and managing conditions like bruxism or gastroesophageal reflux disease, can aid in the long-term management of hypersensitivity. Customized treatment plans should be tailored to each patient's specific needs and preferences, with regular follow-up appointments to evaluate the effectiveness of the treatment and make any necessary adjustments [10]. Research has shown that DH can lead to a range of emotional responses, including anxiety, avoidance behaviors, irritation, and shame. These reactions can significantly affect a patient's psychological well-being, resulting in dietary changes, avoidance of certain foods and beverages, and withdrawal from social situations due to the fear of sharp pain episodes. Therefore, providing patient-centered care is crucial. For effective long-term management of dental hypersensitivity, it is important to educate patients about maintaining good oral hygiene and making lifestyle adjustments. Additionally, patient education should include guidance on the regular use of desensitizing products and the importance of regular dental check-ups for ongoing management and monitoring [11, 12]. Despite being a common issue, studies suggest that DH is often overlooked and improperly treated in clinical practice. Many individuals with DH may not seek medical attention because they believe their symptoms are just temporary sensitivity or an inevitable consequence of aging. The subjective nature of pain perception and the lack of established diagnostic standards further complicate the diagnosis and treatment of DH [13, 14]. Understanding patients' experiences and opinions on DH is crucial. By gaining insight into how this condition affects them, healthcare professionals can tailor their diagnostic and treatment approaches to better meet the needs and preferences of those with DH.

The study aimed to explore patient experiences, and perception of Dentin Hypersensitivity (DH), along with the diagnostic techniques and treatment approaches used. The goal is to better understand these aspects to guide future clinical procedures in addressing the complex issues associated with DH, ultimately reducing discomfort and improving patients' quality of life.

METHODS

A cross-sectional questionnaire-based study was conducted to evaluate the patient experiences and perceptions of DH. The adult patients presented with irritation, intraoral pain, or sensitivity in the individual dental clinics of Lahore, ranging in age from 25 to 65, were included in the study population without regard to gender. Patients with analgesics, mood alteration medications, teeth whitening agents in the last six months, orthodontic therapy, cognitive impairment, chronic pain conditions, fibromyalgia, and temporomandibular joint disorders were excluded. The Institutional Research and Ethics Committee provided ethical approval (ERC APPROVAL NO: UCD/ERCA/24/283). A non-probability convenience sampling technique was utilized to collect data from participants included in this research. A sample size of 1105 participants was calculated with a 90% confidence level, 2.6% margin of error, and by taking the expected percentage of DH and 26.4% respectively. A pre-validated self-administered questionnaire was used [15]. There were 20 items to the questionnaire for evaluating patients' perceptions of DH and 2 for demographic information. Data were collected over three months, from April 2024 to June 2024. The questionnaire was distributed simultaneously through Google Forms and survey handouts. On the other hand, during these months, The Out-Patient Department (OPD) at the University of Lahore examined 3605 patients. The participants were informed about DH before answering, and consent was obtained voluntarily. The study's aim, the identity of the researchers, and the fact that the questionnaire would be only used for the participants' responses and e-mail addresses would be stored only for the study. Participants' identities were kept anonymous and questionnaire answers were kept private. SPSS version 25.0 was used for data entry and analysis. Qualitative variables were presented with frequency and percentages. A chi-square test was applied to see the association of experience and perception towards DH with the age and gender of study participants. P-value < 0.05 was considered statistically significant.

RESULTS

The study comprised 1105 participants, with a slightly higher representation of females (51%) than males (49%).

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Both genders affirmed experiencing pain in their teeth while consuming certain food items, with comparable prevalence rates observed among females (37.3%) and males (36.8%). Among the participants, 481 fell within the 25-40 years' age bracket, 497 were aged 41-60 years, and 127 reported being over 60 years old. The age distribution revealed a higher prevalence of DH in the 41-60 age group (33.8%), followed by the 25-40 age group (31.8%), with a sharp decline in the over-60 age group (8.6%) (Figure 1).

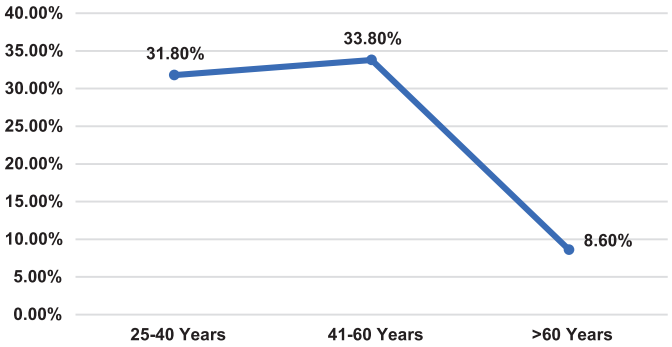

Figure 1: The Onset of Dentine Hypersensitivity in Different Age Groups

Out of the surveyed patients, 74% reported pain in teeth with certain food consumption. Additionally, 79% of the participants expressed concerns about sensitivity in teeth. 58% of the participants rejected the notion that the tooth's length continues to increase. A significant portion, 88% had not received any professional treatment for hypersensitivity, and 75% reported not using any agent for dentine sensitivity. However, 86% of patients also reported dissatisfaction with the agents they were currently using (Table 1).

Table 1: Patient Distribution Based on their Exposure to Hypersensitivity

Distribution of Patients	Responses	N (%)
Pain in Teeth During Consumption of Certain Food Items	Yes	819 (74.1%)
	No	286 (25.9%)
Concerned About Teeth Sensitivity	Yes	876 (79.3%)
	No	229 (20.7%)
The Length of the Tooth Goes on Increasing	Yes	400 (36.19%)
	No	641 (58%)
	Don't Know	64 (5.8%)
Professional Treatment for Hypersensitivity	Yes	132 (11.94%)
	No	973 (88.05%)
Use any Agent for Dentine Hypersensitivity	Yes	268 (24.3%)
	No	837 (75.7%)
Satisfied with the Agents Used	Yes	155 (14.02%)
	No	950 (85.97%)

In response to inquiries regarding the causes of hypersensitivity, 53% of participants reported decayed teeth as a cause, while 47% of participants were unaware of oral prophylaxis as a cause. Notably, 87% of respondents identified improper oral hygiene practices as a contributing factor, and 72% expressed skepticism regarding the impact of climate change. Stress was refuted as a causative factor by 42% of participants. A significant majority (93%) concurred with defective dental treatments as a primary cause. Moreover, a substantial proportion (91%) of participants recognized age as a significant factor predisposing individuals to hypersensitivity (Table 2).

Table 2: Patient Distribution According to their Perception of the Causes for Hypersensitivity

Distribution of Patients	Responses	N (%)
A Decayed Tooth is a Reason for Hypersensitivity	Yes	589 (53.3%)
	No	513 (46.4%)
	Don't Know	3 (0.27%)
Hypersensitivity is Caused due to Oral Prophylaxis	Yes	160 (14.5%)
	No	419 (37.9%)
	Don't Know	526 (47.6%)
Improper Hygiene Causes Dentine Hypersensitivity	Yes	961 (87%)
	No	144 (13%)
Impact on Exposure to Climate Change	Yes	235 (21.3%)
	No	797 (72.1%)
	Don't Know	73 (6.6%)
Stress Causes Tooth Abnormalities that lead to Hypersensitivity	Yes	379 (34.29%)
	No	459 (41.5%)
	Don't Know	267 (24.2%)
Kind of Defective Treatment Leads to Hypersensitivity	Yes	1030 (93.2%)
	No	6 (0.5%)
	Don't Know	69 (6.2%)
Age is a Factor in Hypersensitivity	Yes	1006 (91%)
	No	97 (8.8%)
	Don't Know	2 (0.2%)

72% of patients attributed their condition to harmful habits, while 63% reported concurrent gastritis. Nearly all participants (99%) had not undergone any tooth bleaching procedures, and a significant majority (92%) had no history of systemic diseases or medication use. Virtually all respondents (99%) acknowledged DH's profound impact on their quality of life. Additionally, 78% of participants noted a noticeable improvement in sensitivity following professional treatment interventions (Table 3).

Table 3: Patient Distribution Based on their Perceptions of the Variables Affecting Hypersensitivity

Distribution of Patients	Responses	N (%)
Any Deleterious Habits cause Hypersensitivity	Yes	803 (72.7%)
	No	162 (14.7%)
	Don't Know	140 (12.7%)
Have Acidity or Gastritis	Yes	691 (62.5%)
	No	414 (37.5%)
Recently Undergone a Tooth Bleaching Procedure	Yes	9 (0.8%)
	No	1096 (99.2%)

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Any Systemic Disease	Yes	92 (8.3%)
	No	1013 (91.7%)
Use of Long-Term Medications	Yes	90 (8.1%)
	No	1015 (91.9%)
Sensitivity Problems affect the Quality of Life	Yes	1099 (99.5%)
	No	7 (0.63%)
Improvement in Sensitivity following Professional Treatment	Yes	862 (78%)
	No	142 (12.9%)
	Don't Know	101 (9.1%)

The chi-square test results indicated a strong statistical significance in the variation of patient distribution related to their views on the factors impacting DH, with a ($P < 0.05$). The results indicated that females generally expressed greater concern about dentinal hypersensitivity, reported higher rates of professional treatment, and demonstrated greater satisfaction with treatment compared to males (Table 4). In contrast, the analysis of dentinal hypersensitivity across age groups revealed no significant differences in perceptions and experiences. Notably, younger and middle-aged individuals were more likely to identify decayed teeth as a contributing factor, and nearly all respondents, regardless of age, acknowledged that sensitivity issues affected their quality of life.

Table 4: Association of Patients' Experience and Perception towards Dentinal Hypersensitivity with Gender

Variables	Responses	Male N (%)	Female N (%)	p-Value
Pain in Teeth during Consumption of Certain Food Items	Yes	405 (73.9%)	410 (74.4%)	0.848
	No	143 (26.1%)	141 (25.6%)	
Concerned about Teeth Sensitivity	Yes	394 (71.9%)	477 (86.6%)	<0.001
	No	154 (28.1%)	74 (13.4%)	
Length of the Tooth goes On Increasing	Yes	162 (29.6%)	236 (42.8%)	<0.001
	No	322 (58.8%)	315 (57.2%)	
	Don't Know	64 (11.7%)	0 (0.0%)	
Professional Treatment for Hypersensitivity	Yes	38 (6.9%)	91 (16.5%)	<0.001
	No	510 (93.1%)	460 (83.5%)	
Use any Agent for Dentinal Hypersensitivity	Yes	172 (31.4%)	95 (17.2%)	<0.001
	No	376 (68.6%)	456 (82.8%)	
Satisfied with the Agents used	Yes	10 (1.8%)	144 (26.1%)	<0.001
	No	538 (98.2%)	407 (73.9%)	
Decayed Tooth is a Reason for Hypersensitivity	Yes	266 (48.5%)	319 (57.9%)	0.002
	No	279 (50.9%)	232 (42.1%)	
	Don't Know	3 (0.5%)	0 (0.0%)	
Hypersensitivity is Caused due to Oral Prophylaxis	Yes	9 (1.6%)	151 (27.4%)	<0.001
	No	230 (42.0%)	188 (34.1%)	
	Don't Know	309 (56.4%)	212 (38.5%)	
Improper Hygiene cause Dentinal Hypersensitivity	Yes	548 (100.0%)	407 (73.9%)	<0.001
	No	0 (0.0%)	144 (26.1%)	
Impact on Exposure to Climate Change	Yes	77 (14.1%)	156 (28.3%)	<0.001
	No	471 (85.9%)	322 (58.4%)	
	Don't Know	0 (0.0%)	73 (13.2%)	
Stress causes Tooth Abnormalities that Lead to Hypersensitivity	Yes	149 (27.2%)	228 (41.4%)	<0.001
	No	228 (41.6%)	230 (41.7%)	
	Don't Know	171 (31.2%)	93 (16.9%)	
Kind of Defective Treatment Leads to Hypersensitivity	Yes	478 (87.2%)	546 (99.1%)	<0.001
	No	3 (0.5%)	3 (0.5%)	
	Don't Know	67 (12.2%)	2 (0.4%)	
Age is a Factor in Hypersensitivity	Yes	539 (98.4%)	461 (83.7%)	<0.001
	No	9 (1.6%)	88 (16.0%)	
	Don't Know	0 (0.0%)	2 (0.4%)	
Any Deleterious Habits cause Hypersensitivity	Yes	335 (61.1%)	462 (83.8%)	<0.001
	No	79 (14.4%)	83 (15.1%)	
	Don't Know	134 (24.5%)	6 (1.1%)	

DISCUSSION

DH was a condition where dentinal tubules were exposed due to factors like gingival recession, enamel erosion, abrasion, attrition, and tooth whitening. These can cause pain and gradual enamel and dentine loss, while tooth whitening can temporarily increase hypersensitivity. Understanding these factors was crucial for developing targeted diagnostic strategies, and clinical examinations were the foundation for diagnosing DH. Dental practitioners can effectively reduce the discomfort associated with DH and improve patients' oral health-related quality of life by combining cutting-edge diagnostic techniques, evidence-based therapies, and patient-centered education [16]. To guarantee that those impacted by this common ailment receive the best care possible, further research was required to investigate innovative therapy modalities and improve currently implemented treatment regimens. The study's findings revealed a substantial prevalence of DH among the surveyed patients, with 74% reporting experiencing symptoms and 80% of the participants were concerned about their sensitivity. Notably, this aligns with previous epidemiological studies, reinforcing DH's status as a substantial oral health concern [16]. The study showed females exhibited a higher prevalence than males which was consistent with the study conducted by Idon PI *et al* [17]. Such gender disparities could potentially be attributed to a myriad of factors including hormonal influences, differential oral hygiene practices, or even varying pain thresholds, warranting further exploration in subsequent studies. Moreover, these findings shed light on age-related trends in DH prevalence, with the mid-age demographic of 41-60 years displaying heightened sensitivity, followed by a decline in prevalence beyond the age of 60 years. These findings were consistent

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with a similar study by Nausheen N et al which showed a greater trend in 40–55-year-olds [18]. Such age-related variations may be attributable to factors including lifetime dentine deposition, subsequent pulp atrophy, or even tooth loss in later age groups. In the study, 58% of participants did not notice an increase in tooth length. However, 36% reported an increase, which may indicate a gingival recession. Hatipoğlu Ö *et al.*, highlighted gingival recession as a significant cause of dentin hypersensitivity. They noted that the loss of periodontal attachment at the root surface can expose dentin, leading to sensitivity. If left untreated, gingival recession can result in the deposition of secondary dentin, pulp atrophy, and potentially tooth loss, especially in older individuals [19]. Moreover, this study found that 88% of patients had not received any professional treatment for DH and were not using any products to manage the condition. This was similar to the findings of Mosquim V *et al.*, who reported that 80% of participants were not using any products for DH [11]. This lack of professional intervention and appropriate use of management products signifies a large gap in the treatment and awareness of DH. In this investigation, participants identified several recurrent factors contributing to DH, including dental caries, inadequate oral hygiene practices, faulty dental treatments, and the natural aging process. Interestingly, the participants discounted stress as a significant contributor to DH and expressed uncertainty regarding its association with changing weather. These discernments align closely with findings reported by TA AS *et al* [15]. When asked about the variables affecting DH, 72% of patients identified deleterious habits as a cause. This finding was consistent with Mosquim V *et al.*, who identified parafunctional habits such as abrasion and attrition as causes, linking hard tissue loss to dentine exposure [11, 18]. Furthermore, 63% of patients reported experiencing gastritis. While Arua et al., identified acids as a cause of DH, Hatipoğlu Ö *et al.*, found no significant association between DH and conditions such as reflux, vomiting, and consumption of acidic foods [18, 19]. The alignment of these findings with similar studies underscores the multifaceted nature of DH, where both mechanical habits and biological factors play a role. In this study, more than 90% of patients did not have any systemic disease, nor were they taking any medication for it. However, 99% accepted that DH was affecting their quality of life. These results were consistent with similar findings in the literature, emphasizing the significant impact of lifestyle and dietary habits on DH, as well as the profound effect this condition has on patients' daily lives [20, 15]. The high percentage of patients reporting a diminished quality of life highlights the need for greater awareness and better management strategies for DH. Limitations of the study, including its cross-sectional design and reliance on self-reported data, must be considered when interpreting the findings. Future research employing longitudinal approaches could assess the long-term efficacy of different management strategies and investigate factors influencing patient adherence and treatment outcomes.

CONCLUSIONS

In summary, it was critical to comprehend patients' experiences and perspectives on DH to deliver individualized care and maximize treatment results. To reduce patients' suffering and enhance the quality of their oral health, a multimodal diagnostic approach and evidence-based care techniques were essential.

Authors Contribution

Conceptualization: TN
Methodology: AC, SI
Formal analysis: SI, NM
Writing, review and editing: MSS, NM, RI

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

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