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Integrating Genomics Into Dentistry: Building Knowledge, Shaping Perspectives, And Enhancing Practices

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ABSTRACT

Aim: To assess the knowledge, attitudes, and practices regarding genomics in dentistry among dental professionals in India.

Materials and Methodology: A descriptive cross-sectional survey was conducted with 400 dental professionals, including undergraduates, postgraduates, academicians, and private practitioners. Data were collected using a structured online questionnaire covering demographics, knowledge, attitudes, and practices related to genomics. Statistical analysis, including chi-square tests and logistic regression, was performed to identify associations between demographic factors and survey responses.

Results: The study revealed significant variations in awareness of genomics across different educational qualifications. The most knowledgeable individuals were undergraduate dental students, especially when it came to the Human Genome Project and genetics in preventative care. Just 61.3% of respondents were aware of genomics' use in diagnostics, but 93% of respondents acknowledged its potential in preventative dentistry. With 76.5% of respondents supporting genetic counselling services, the majority favoured incorporating genomic knowledge into dental practice and education. The lack of testing facilities (41.25%), cultural reasons like religious views (17%), and financial limitations (23%), were the main obstacles.

Conclusion: The study highlights a positive perception of genomics among dental professionals but identifies significant gaps in knowledge and application, particularly among private practitioners. Targeted efforts to incorporate genomics into dental curricula, along with professional development programs, are essential to bridge these gaps and enhance the integration of genomics into dental practice.

Keywords: *Awareness, genomics, dental, genes, genetics, barriers*

1. INTRODUCTION

The field of dentistry is undergoing a significant transformation, fueled by advancements in genomics that promise to reshape the way oral health care is delivered. Genomics, the study of an organism's entire genetic makeup, has already revolutionized medicine by enabling more precise diagnoses, personalized treatment plans, and targeted prevention strategies.[1] Its integration into dentistry offers similar transformative potential, as researchers continue to uncover the genetic underpinnings of oral diseases and their links to systemic health. This burgeoning area of research holds the key to a future where dental care moves beyond symptom management to a predictive and preventive paradigm, grounded in the unique genetic profile of each patient.[2,3]

Diseases including tooth caries, periodontitis, and oral malignancies exhibit substantial hereditary predispositions, demonstrating the close relationship between oral health and both genetic and environmental variables. Genes and genetic variations linked to these disorders have been easier to identify due to the development of genomic technologies like next-generation sequencing and bioinformatics tools.[4] Variations in genes influencing salivary content, microbial interactions in the oral cavity, and enamel development, for example, have been connected to caries susceptibility. Similar to this, genetic markers for oral squamous cell carcinoma and aggressive periodontitis have been found, opening the door to earlier detection and more successful treatments.[5]

The use of genetics in dentistry is still very new, despite these developments. The lack of knowledge and comprehension of genetic research among dental practitioners is one of the main obstacles. Research has shown that although the majority of dental professionals and students are aware of genomics' potential, many believe they lack the necessary skills to use it in clinical settings.[6,7] In order to ensure that the upcoming generation of dentists is prepared to take advantage of these breakthroughs, it is imperative that dentistry curricula be revised and include genetics a central component.[8,9]

Another important factor in the adoption of genomics is the attitudes and opinions of dental practitioners. Studies indicate that favourable perceptions of genomics are associated with a readiness to accept its practical uses.[10, 11] Misconceptions and concerns over the intricacy of genomic science, however, may prevent it from being widely accepted. Targeted initiatives that highlight the accessibility and clinical significance of genetics are needed to overcome these obstacles and instill confidence in dental professionals.[12, 13]

In summary, genetics in dentistry has both a bright and difficult future. Dental practitioners must be prepared with the skills and information necessary to fully utilise the field's potential as it continues to develop. By assessing current levels of knowledge, attitudes, and practices, this article aims to provide a roadmap for integrating genomics into dental education and practice. Through a concerted effort to bridge gaps and address challenges, the dental profession can usher in a new era of personalized care, ultimately transforming the way oral health is understood and managed.

2. MATERIALS AND METHODOLOGY

A descriptive cross-sectional survey was conducted to assess the knowledge, attitudes, and practices regarding genomics in dentistry among 400 dental professionals in India.

The participants included dental undergraduates, postgraduates, academicians, and private practitioners from various institutions and clinics across the country. Inclusion criteria required participants to be actively engaged in dental practice or education. Individuals unwilling to provide informed consent were excluded.

A convenience sampling method was employed to recruit participants. The target sample size of 400 was determined based on expected prevalence rates of awareness about genomics in dentistry and statistical considerations for ensuring adequate power.

A structured questionnaire was developed and hosted on Google Forms. The questionnaire comprised four sections:

1. **Demographics:** Information on age, gender, marital status, educational qualification, specialization, socioeconomic status, and area of residence.
2. **Knowledge:** Questions assessing familiarity with the Human Genome Project, genomic applications in dental diagnostics, specific genomic markers, and the role of genomics in preventive care.
3. **Attitudes:** Items measuring perceptions about genetic counseling, necessity of genetic testing, professional involvement in testing, diseases associated with genomics, and beliefs related to ethics and religion.
4. **Practices:** Questions exploring barriers to genomic testing, its impact on patient knowledge and satisfaction, and integration into dental practice and curriculum.

The questionnaire was validated for content and clarity through expert reviews. A pilot test with 30 participants was conducted, and necessary modifications were made based on feedback.

Participants were invited through email and professional networks. A brief description of the study and a link to the Google

Form were provided. The form began with an informed consent section, ensuring voluntary participation and confidentiality of responses.

Ethical Considerations:

The study protocol was reviewed and approved by the Institutional Ethics Committee of SGT University, Gurugram. Participants provided electronic consent before proceeding with the survey. Data was anonymized and stored securely.

Statistical Analysis:

The collected data was exported into Microsoft Excel and analyzed using SPSS software. Descriptive statistics were used to summarize demographic characteristics and responses. Chi-square tests and logistic regression analyses were performed to explore associations between demographic factors and knowledge, attitudes, and practices.

This methodology ensured a comprehensive and systematic approach to understanding the role of genomics in dentistry among dental professionals in India.

3. RESULTS

This questionnaire-based survey was conducted among 400 dental professionals. Data was collected and result was analysed.

S.NO.	CHARACTERISTICS	OPTIONS	FREQUNCY	PERCENTAGE
1.	AGE	Below 18 years	5	1.3
		18-34 years	365	91.3
		35-44 years	30	7.5
		45 years and above	0	0
2.	Sex	Male	109	27.3
		Female	291	72.8
3.	Marital status	Married	77	19.3
		Unmarried	323	80.8
		Others	0	0
4.	Educational Qualification	BDS Undergraduate	262	65.5
		Postgraduate	84	21.0
		Faculty/ Academician/ Research fellow	35	8.8
		Private practitioners	19	4.8
5.	SPECIALIZATION	Oral medicine and radiology	6	1.5
		Oral surgery and maxillofacial surgery	61	15.3
		Prosthodontics	11	2.8
		Conservative dentistry and endodontics	16	4.0
		Oral pathology	13	3.3
		Pedodontics and preventive dentistry	23	5.8
		Periodontics	17	4.3

		Orthodontics	12	3.0
		Public health dentistry	16	4.0
		Not applicable/ Others	225	56.3
6.	SOCIO-ECONOMIC STATUS	Upper class	23	5.8
		Upper middle class	166	41.5
		Middle class	211	52.8
		Lower Middle Class	0	0
		Lower Class	0	0
7.	AREA OF PRACTICE/ RESIDENCE AREA	Urban	365	91.3
		Rural	35	8.8

Table 1: Demographic Details of the Study Participants

The Table 1 depicts the demographic and socio-economic profile of dental professionals, revealing a predominantly young cohort, with 91.3% aged 18–34 years and no participants above 45 years. Female participants constituted the majority (72.8%), and most respondents (80.8%) were unmarried. Educational qualifications showed that 65.5% were BDS undergraduates, followed by 21% postgraduates, and 8.8% faculty members, academicians, or research fellows, while private practitioners accounted for 4.8%. Regarding specialization, 56.3% were non-specialists or categorized as "others," with oral surgery and maxillofacial surgery (15.3%) being the most represented specialty. Socio-economic status indicated a dominance of the middle class (52.8%), followed by the upper-middle class (41.5%), with no representation from the lower classes. Additionally, urban areas were overwhelmingly represented (91.3%), with minimal participation from rural regions (8.8%). This data provides valuable insights into the composition of dental professionals studied.

S. NO.	Questions	Options	Frequency	Percentage
1.	Have you heard about implications of 'Human Genome Project' in Dentistry?	Yes	274	68.5
		No	126	31.5
2.	Are you familiar with application of genomics in diagnosing dental conditions?	Yes	245	61.3
		No	155	38.8
3.	Are you aware about any specific genomic markers associated with Oral Health?	Yes	261	65.3
		No	139	34.8
4.	Can advancement in Genomics influence preventive dental care practice (Primary Prevention)?	Yes	372	93.0
		No	28	7.0
5.	Are you aware of Genetic counselling service for Dental patients?	Yes	306	76.5
		No	94	23.5
6.	Is Genetic testing necessary while Genetic counselling during Prenatal appointments?	Yes	336	84.0
		No	64	16.0
7.	Which of the following professional may be involved in delivery of Genetic testing?	General practitioner	70	17.5

		Geneticist	66	16.5
		Both A and B	264	66.0
8.	Which of the following diseases are associated with Genomic Testing?	Periodontal disease	30	7.5
		Mouth ulcers	85	21.25
		Dental caries	38	9.5
		Halitosis	55	13.75
		Oral cancer	115	28.75
		Anemia	36	9
		Cleft lip/palate	24	6
		Orthodontic malocclusion	17	4.25

Table 2: Distribution of the participants across knowledge domain

The participants' distribution across knowledge domains is seen in table 2. The Human Genome Project's implications for dentistry have been heard about by a sizable majority (68.5%), suggesting a moderate level of awareness. There is a need for more training in this area, though, as only 51.3% of respondents are aware of how genetics can be used to diagnose dental disorders. A resounding 93% of respondents think that advances in genomics can have a positive impact on preventative dental care practices, and more than half (54.3%) are aware of specific genomic markers linked to oral health. Furthermore, 76.5% of respondents are aware that dental patients can receive genetic counselling. The majority of participants (84%) have a favourable predisposition towards the adoption of genetic testing, believing it to be essential during prenatal visits. The majority (65%) cited geneticists and general practitioners as important contributions when discussing the professions who provide genetic testing. Oral cancer is the most often identified ailment linked to genetic testing (28.75%), followed by dental caries (9.5%) and cleft lip/palate (14.25%), with a small percentage (4.25%) linked to malocclusions. Overall, the results point to a favourable view of genomics in dentistry, but they also point to knowledge gaps in certain areas, especially with regard to the variety of disorders associated with genomic testing and its diagnostic applications. Programs for training and education could aid in filling these gaps.

S. NO.	Questions	Options	Frequency	Percentage
1.	Genomics play a vital role in early detection for Oral Diseases and its prevention.	Strongly disagree	25	6.3
		Disagree	6	1.5
		Neutral	49	12.3
		Agree	199	49.8
		Strongly agree	121	30.3
2.	Genomics will be relevant in advancing dental care practice	Strongly disagree	5	1.3
		Disagree	10	2.5
		Neutral	97	24.3
		Agree	163	40.8
		Strongly agree	125	31.3
3.	Genetic testing should be done if one's family/ relative member has Genetic disorder	Strongly disagree	7	1.8
		Disagree	0	0

		Neutral	69	17.3
		Agree	177	44.3
		Strongly agree	147	36.8
4.	Religious beliefs impact the Genetic Testing procedures in India.	Strongly disagree	22	5.5
		Disagree	23	5.8
		Neutral	117	29.3
		Agree	158	39.5
		Strongly agree	80	20.0
5.	Genomic information should be integrated in Personalized Dental Care	Strongly disagree	5	1.3
		Disagree	0	0
		Neutral	89	22.3
		Agree	188	47.0
		Strongly agree	118	29.5
6	Genomic Testing hampers the Ethical considerations.	Strongly disagree	11	2.8
		Disagree	128	32.0
		Neutral	124	31.0
		Agree	107	26.8
		Strongly agree	30	7.5
7.	What barriers do you anticipate in adoption of Genomic testing?	Parental consent	30	7.5
		Economical constraints	92	23
		Availability of testing	165	41.25
		Religious beliefs	68	17
		Ethical considerations	45	11.25

Table 3: Distribution of the participants across attitude domain

Participants' opinions regarding the use of genetics in dentistry are revealed in table 3. Most people (49.8% agree, 30.3% strongly agree) think that early detection and prevention of oral disorders are greatly aided by genomics. Similarly, the majority of respondents believe that genetics can help advance dental care methods (40.8% agree, 31.3% strongly agree). 44.3% of respondents agree and 36.8% strongly agree that genetic testing is necessary for people whose family members have genetic illnesses. In India, 39.5% of respondents agree and 20% strongly agree that religious beliefs have an impact on genetic testing methods; yet, a sizable fraction (29.3%) are indifferent. With 47% agreeing and 29.5% strongly agreeing, the vast majority of people are in favour of incorporating genomic data into individualised dental care. Ethical concerns are less significant, with 32% disagreeing and only 26.8% agreeing that genomic testing hampers ethical considerations. Barriers to the adoption of genomic testing include the availability of testing (41.25%), economic constraints (23%), and religious beliefs (17%), with fewer citing ethical considerations (11.25%) or parental consent (7.5%). Overall, the data suggests strong support for genomics in dentistry but highlights challenges in its implementation, including logistical, economic, and cultural barriers.

S. NO.	Questions	Options	Frequency	Percentage
1.	Genomic information influences patient knowledge evaluation.	Strongly disagree	0	0
		Disagree	14	3.5
		Neutral	78	19.5
		Agree	222	55.5
		Strongly agree	86	21.5
2.	Increased knowledge and utilization of Genomics in dentistry will improve patient satisfaction.	Strongly disagree	0	0
		Disagree	10	2.5
		Neutral	78	19.5
		Agree	186	46.5
		Strongly agree	126	31.5
3.	Patients are interested in Genetic predisposition to dental conditions.	Strongly disagree	0	0
		Disagree	25	6.3
		Neutral	145	36.3
		Agree	160	40.0
		Strongly agree	70	17.5
4.	Genomic testing can be incorporated in Dental practice.	Strongly disagree	0	0
		Disagree	10	2.5
		Neutral	126	31.5
		Agree	171	42.8
		Strongly agree	93	23.3
5.	Regulation of Genomic testing is beneficial in Indian Healthcare practices.	Strongly disagree	0	0
		Disagree	0	0
		Neutral	95	23.8
		Agree	215	53.8
		Strongly agree	90	22.5
6.	Genomic testing can increase anxiety among patients if they are informed prior about their disease susceptibility.	Strongly disagree	5	1.3
		Disagree	49	12.3
		Neutral	142	35.5
		Agree	166	41.5
		Strongly agree	38	9.5
7.	Genomics can be added as a part syllabus in Dental curriculum.	Strongly disagree	12	3.0
		Disagree	0	0
		Neutral	108	27.0

		Agree	141	35.3
		Strongly agree	139	34.8

Table 4: Distribution of the participants across practices domain

The table 4 highlights participants' perceptions and practices regarding the integration of genomics in dentistry. Most respondents (55.5% agree, 21.5% strongly agree) believe that genomic information influences patient knowledge evaluation, reflecting its perceived importance in patient education. A large majority (46.5% agree, 31.5% strongly agree) think that increased knowledge and utilization of genomics in dentistry will improve patient satisfaction. Furthermore, 40% agree and 17.5% strongly agree that patients are interested in knowing their genetic predisposition to dental conditions.

The potential incorporation of genomic testing in dental practice is supported by 42.8% who agree and 23.3% who strongly agree. Additionally, a majority (53.8% agree, 22.5% strongly agree) feel that regulating genomic testing would benefit Indian healthcare practices. However, concerns about genomic testing causing anxiety in patients are evident, with 41.5% agreeing and 9.5% strongly agreeing, though a significant proportion remain neutral (35.5%).

The inclusion of genomics in the dental curriculum is also well-supported, with 35.3% agreeing and 34.8% strongly agreeing, reflecting the belief that it could enhance future dental education. Overall, the findings demonstrate a positive outlook on integrating genomics into dentistry, while highlighting concerns about patient anxiety and the need for proper regulation and education.

			EDUCATIONAL QUALIFICATION				
S. No.	Questions		BDS Undergraduate	Postgraduate	Faculty/ Academician/ Research fellow	Private practitioners	p value
	KNOWLEDGE						
1.	Have you heard about implications of 'Human Genome Project' in Dentistry?	Yes	165	59	31	19	.000
		No	97	25	4	0	
2.	Are you familiar with application of genomics in diagnosing dental conditions?	Yes	140	55	31	19	.000
		No	122	29	4	0	
3.	Are you aware about any specific genomic markers associated with Oral Health?	Yes	138	76	28	19	.000
		No	124	84	35	19	
4.	Can advancement in Genomics influence preventive dental care practice (Primary Prevention)?	Yes	242	80	31	19	.349
		No	20	4	4	0	
5.	Are you aware of Genetic counselling service for Dental patients?	Yes	180	76	31	19	.000
		No	822	8	4	0	
6.	Is Genetic testing necessary while Genetic counselling	Yes	206	80	31	19	.001
		No	56	4	4	0	

	during Prenatal appointments?						
7.	Which of the following professional may be involved in delivery of Genetic testing?	General practitioner	47	5	13	5	.000
		Geneticist	40	13	9	4	
		Both A and B	175	66	13	10	
	ATTITUDE						
1.	Genomics play a vital role in early detection for Oral Diseases and its prevention.	Strongly disagree	20	4	1	0	.000
		Disagree	6	0	0	0	
		Neutral	38	4	7	0	
		Agree	155	39	0	5	
		Strongly agree	43	37	27	14	
2.	Genomics will be relevant in advancing dental care practice	Strongly disagree	4	0	1	0	.000
		Disagree	6	4	0	0	
		Neutral	84	9	4	0	
		Agree	114	46	3	0	
		Strongly agree	54	25	27	19	
3.	Genetic testing should be done if one's family/ relative member has Genetic disorder	Strongly disagree	6	0	1	0	.000
		Disagree	0	0	0	0	
		Neutral	52	13	4	0	
		Agree	131	46	0	0	
		Strongly agree	73	25	30	19	
4.	Religious beliefs impact the Genetic Testing procedures in India.	Strongly disagree	9	12	1	0	.000
		Disagree	7	0	6	10	
		Neutral	95	13	4	5	
		Agree	112	42	0	4	
		Strongly agree	39	17	24	0	
5.	Genomic information should be integrated in Personalized	Strongly disagree	4	0	1	0	.000

	Dental Care	Disagree	0	0	0	0	
		Neutral	60	25	4	0	
		Agree	146	34	3	5	
		Strongly agree	52	25	27	14	
6.	Genomic Testing hampers the Ethical considerations.	Strongly disagree	7	0	4	0	.000
		Disagree	71	34	9	14	
		Neutral	91	29	4	0	
		Agree	80	17	5	5	
		Strongly agree	13	4	13	0	
	PRACTICES						
1.	Genomic information influences patient knowledge evaluation.	Strongly disagree	0	0	0	0	.000
		Disagree	14	0	0	0	
		Neutral	65	9	4	0	
		Agree	161	58	3	0	
		Strongly agree	22	17	28	19	
2.	Increased knowledge and utilization of Genomics in dentistry will improve patient satisfaction.	Strongly disagree	0	0	0	0	.000
		Disagree	10	0	0	0	
		Neutral	61	13	4	0	
		Agree	132	46	3	5	
		Strongly agree	59	25	28	14	
3.	Patients are interested in Genetic predisposition to dental conditions.	Strongly disagree	0	0	0	0	.000
		Disagree	22	0	3	0	
		Neutral	103	29	4	9	
		Agree	126	34	0	0	
		Strongly agree	11	21	28	10	
4.	Genomic testing can be incorporated in Dental practice.	Strongly disagree	0	0	0	0	.000
		Disagree	10	0	0	0	
		Neutral	105	17	4	0	

		Agree	121	42	3	5	
		Strongly agree	26	25	28	14	
5.	Regulation of Genomic testing is beneficial in Indian Healthcare practices.	Strongly disagree	0	0	0	0	.000
		Disagree	0	0	0	0	
		Neutral	78	13	4	0	
		Agree	148	46	16	5	
		Strongly agree	36	25	15	14	
6.	Genomic testing can increase anxiety among patients if they are informed prior about their disease susceptibility.	Strongly disagree	0	0	0	5	.000
		Disagree	24	25	0	0	
		Neutral	112	17	4	9	
		Agree	120	38	3	5	
		Strongly agree	0	0	0	0	
7.	Genomics can be added as a part syllabus in Dental curriculum.	Strongly disagree	12	83	95	72	.000
		Disagree	0	0	0	0	
		Neutral	83	13	7	5	
		Agree	95	46	0	0	
		Strongly agree	72	25	28	14	

Table 5: Knowledge, attitude & practices of Genomics in Dentistry Across Different Educational Qualifications

Significant differences in the understanding, attitudes, and practices of genomics in dentistry amongst people with varying educational backgrounds are highlighted in Table 5. In every area of genomics, including the implications of the Human Genome Project, the use of genomics in the diagnosis of dental disorders, particular genetic mutations associated with oral health, and developments in genomics for preventive dentistry, undergraduate dental students (BDS) showed the highest level of understanding. For example, only one private practitioner knew of the Human Genome Project, but 165 undergraduate responders did. Private practitioners consistently showed the lowest awareness across all groups, according to the data, whereas postgraduate students and faculty members exhibited intermediate levels of understanding. The majority of respondents in every demographic were in favour of incorporating genetics into professional dentistry, with undergraduates holding the most sway in this regard. Statistically significant differences ($p < 0.001$) were observed for most variables, except for advancements in genomics and preventive dentistry ($p = 0.149$). For attitude and practices domain as well undergraduate dental students exhibited the highest awareness levels across all surveyed topics, including the implications of the Human Genome Project, the use of genomics in diagnosing dental conditions, and the understanding of specific genetic mutations related to oral health. Private practitioners were consistently the least familiar with genetic ideas, whereas postgraduate students and faculty members exhibited a reasonable level of awareness. For the majority of factors, including the importance of genomics in professional dentistry and the need for genetic testing during prenatal treatment, key findings show statistically significant variations in awareness ($p < 0.001$). However, there was no discernible difference in the groups' understanding of genetic developments for preventative dentistry ($p = 0.149$). Furthermore, the majority of respondents, undergraduates in particular, supported the use of genomic data into dental practice. The information emphasises how vital it is to include genetic education in dental programs and give working dentists continual opportunity for professional growth. Improving genetic understanding could help overcome current gaps and make it easier to use effectively in dental treatment.

4. DISCUSSION

The results of this study demonstrate a substantial disparity in genomics-related knowledge, attitudes, and practices among Indian dental practitioners, with major differences across educational backgrounds. The most knowledgeable individuals were undergraduate dental students, especially when it came to the Human Genome Project's ramifications, oral health genomic markers, and the application of genomics in preventative dentistry. Private practitioners, on the other hand, demonstrated little familiarity, highlighting the necessity of ongoing professional development to keep dentists in practice up to date on new developments in genomics.

A striking 93% of respondents acknowledged the potential of genomics in enhancing preventive dental care, consistent with global trends emphasizing the shift toward predictive and personalized medicine. However, despite this recognition, only 61.3% of participants were familiar with the practical applications of genomics in diagnosing dental conditions, suggesting a disconnect between theoretical awareness and clinical application. This gap can be attributed to the nascent integration of genomics into dental curricula and a lack of hands-on exposure in clinical settings.[14]

Attitudinally, most respondents supported the inclusion of genomic information in personalized dental care, with 76.5% endorsing genetic counseling services for dental patients. This finding aligns with the growing global acceptance of genomics as a cornerstone of modern healthcare. However, barriers such as economic constraints, limited availability of testing facilities, and cultural factors, including religious beliefs, were identified as significant challenges to the adoption of genomic testing in dental practice.[15]

Interestingly, ethical concerns surrounding genomic testing were not perceived as a major barrier by most participants, with 32% disagreeing that it hampers ethical considerations. This contrasts with existing literature highlighting ethical dilemmas in genomics, suggesting that awareness campaigns should address these nuanced aspects to prepare practitioners for real-world challenges.

The study also revealed a strong consensus (70.1% agree/strongly agree) for incorporating genomics into the dental curriculum. This reflects a recognition of the transformative potential of genomic education in bridging knowledge gaps and equipping future dentists with the skills necessary for its clinical application. However, the statistically significant differences in awareness and attitudes across educational levels ($p < 0.001$ for most variables) indicate a pressing need to standardize genomic education across all tiers of dental training.

Lastly, the study emphasizes the role of genomics in improving patient satisfaction, with 78% of respondents agreeing that its utilization could enhance patient outcomes. This finding aligns with the broader narrative of patient-centered care, where genomic insights are leveraged to tailor interventions to individual genetic profiles, ensuring better clinical outcomes.[16]

5. CONCLUSION

While the findings underscore a generally positive perception of genomics among dental professionals, the evident gaps in knowledge and practice necessitate targeted interventions. Future efforts should focus on integrating genomics into the dental curriculum, establishing robust training modules for practitioners, and addressing logistical and cultural barriers to its implementation. By fostering a comprehensive understanding of genomics, the dental profession can harness its full potential to revolutionize oral healthcare delivery.

REFERENCES

[1] Kavitha B, Priyadharshini V, Sivapathasundharam B, Saraswathi TR. Role of genes in oro-dental diseases. Indian Journal of Dental Research. 2010 Apr 1;21(2):270-4.

[2] Townsend GC, Aldred MJ, Bartold PM. Genetic aspects of dental disorders. Australian Dental Journal. 1998 Aug;43(4):269-86.

[3] Kurisu K, Tabata MJ. Human genes for dental anomalies. Oral Diseases. 1997 Jul;3(4):223-8.

[4] Tyagi R, Khuller N, Sharma A, Khatri A. Genetic basis of dental disorders: A review. J Oral Health Comm Dent. 2008;2(3):55-61.

[5] Werneck RI, Mira MT, Trevilatto PC. A critical review: an overview of genetic influence on dental caries. Oral Diseases. 2010 Oct;16(7):613-23.

[6] Kinane DF, Hart TC. Genes and gene polymorphisms associated with periodontal disease. Critical Reviews in Oral Biology & Medicine. 2003 Nov;14(6):430-49.

[7] Cavallari T, Arima LY, Ferrasa A, Moysés SJ, Moysés ST, Herai RH, Werneck RI. Dental caries: Genetic and protein interactions. Archives of Oral Biology. 2019 Dec 1;108:104522.

[8] Opal S, Garg S, Jain J, Walia I. Genetic factors affecting dental caries risk. Australian dental journal. 2015 Mar;60(1):2-11.

[9] Slavkin HC. The human genome, implications for oral health and diseases, and dental education. Journal of Dental Education. 2001 May;65(5):463-79.

[10] Stephanopoulos G, Garefalaki ME, Lyroudia K. Lyroudia: Genes and related proteins involved in AI J Dent Res. 2005;84:1117–26

[11] Essenfelder GM, Bruzzone R, Lamartine J, Charollais A, Blanchet-Bardon C, Barbe MT, et al Connexin30 mutations responsible for hidrotic ectodermal dysplasia cause abnormal hemichannel activity Hum Mol Genet. 2004;13:1703–14

[12] De Brito Junior R, Scarel-Caminaga R, Trevilatto P, De Souza A, Barros S (2004). Polymorphisms in the vitamin D receptor gene are associated with periodontal disease. J Periodontol 75: 1090–1095.

[13] Bretz W, Corby P, Hart T et al (2005a). Dental caries and microbial acid production in twins. Caries Res 39: 168–172.

[14] Loos BG, Van Dyke TE. The role of inflammation and genetics in periodontal disease. Periodontology 2000. 2020 Jun;83(1):26-39.

[15] Vieira AR, Modesto A, Marazita ML. Caries: review of human genetics research. Caries research. 2014 May 21;48(5):491-506.

[16] Shungin D, Haworth S, Divaris K, Agler CS, Kamatani Y, Keun Lee M, Grinde K, Hindy G, Alaraudanjoki V, Pesonen P, Teumer A. Genome-wide analysis of dental caries and periodontitis combining clinical and self-reported data. Nature communications. 2019 Jun 24;10(1):2773.