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REVIEW ARTICLE

CLINICAL ORAL IMPLANTS RESEARCH WILEY

A critical review of qualitative research publications in dental implants from 2006 to 2020

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Abstract

Objectives: This critical review is aimed to investigate the current status of qualitative research in dental implant research and to explore the quality of available information.

Material and methods: A systematic search was done on the journal databases to identify dental implant research articles that used qualitative methodology during 2006 and 2020. The resulting articles were appraised against the checklist offered by the Critical Appraisal Skills programme (CASP) tool. Also, the theories evolved from the research were reviewed to understand the value of this methodology in dental implant research.

Results: Twenty-five (25) articles out of the 8,421 original results were identified as using qualitative methodology. The researchers have sought to identify the views of patients about tooth loss, dental implants, and the information they receive from dental professionals, and views of the dentists about dental implant practice. The review found that there were few inconsistencies in the quality of such research especially the qualitative data analysis.

Conclusions: The quantity of qualitative research in dental implants remains low; however, the quality has improved in the past two decades. Despite these improvements, there is still a lack of research in understanding both patients' and dentists' views on dental implant procedures and management.

KEYWORDS

behavioral sciences, clinical research, clinical trials, prosthodontics, public health

1 | INTRODUCTION

Qualitative research methods have a long track record in healthcare sciences (Bullock, 2010). Qualitative research outcomes are increasingly being used in policy documents and for developing clinical guidance by organisations such as NICE and NIH (Carroll, 2017; Tan et al., 2009). In contrast, the role of qualitative methodology in dental research is not well established as in other areas in medicine (Masood et al., 2010, 2011; Stewart et al., 2008). The majority of dental research is about seeking evidence, through quantitative methods such as randomised control trials (RCTs) and questionnaire surveys (Jayachandran et al., 2015; Stewart et al., 2008). Such studies identified only the number of positive or negative responses. It is not possible with such research methodology to understand the reasons behind why a particular response was made. Qualitative research offers a deeper and richer

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understanding of the issues and perspectives of the individual (Sofaer, 1999).

Qualitative research helps to synthesis theories about an unknown subject by allowing unstructured investigations to take place. For example, an interview with open-ended questions will open multiple themes from the responses. Once theorised, these themes may be further investigated using structured quantitative methods. At present, healthcare researchers borrow theories from social scientists (e.g. psychology, economics and behavioural science) (Sofaer, 1999). Therefore, employing more qualitative research in health sciences especially in dentistry will develop a rich vein of independent theories.

A review in 2011 appraised the qualitative dental research published between 1999 and 2006 using the Critical Appraisal Skills Programme tool (CASP) and concluded that the quality of the literature was poor (Al-Moghrabi et al., 2019; Masood et al., 2011). This appraisal was focussed on the methodological rigour, rather than the subject of research. This approach was justified as it was argued that the outcome of the research will not be valid if the methodology lacked rigour.

The aim of this research project was to appraise the qualitative publications in dentistry in the past decade since the last review. However, research in dentistry has expanded to the level that individual bibliometric analyses are reported for different specialties in dentistry (Chen et al., 2020; Jayaratne & Zwahlen, 2015; Tarazona et al., 2017). Dental implants are one such field where the research and the number of publications are increasing. Therefore, the current review focuses on qualitative publications from 2006 to 2020, as a follow-up of the previous report (Masood et al., 2011) using the CASP tool, but limiting the subject area to dental implant research.

2 | MATERIALS AND METHODS

Ethical approval was not required for this systematic review. The methodology involved two stages adhering to PRISMA 2009 checklist (Liberati et al., 2009). The first stage was the creation of a database via an article search and secondly an appraisal of the selected articles. A systematic search of dental implant research using qualitative methodology was performed on the following journal databases: Ovid version of MEDLINE; Web of Science, Science Direct, Scopus and EMBASE. The search strategy included the terms as listed in Table 1. The search combinations were performed using AND, OR and NOT. The results were restricted to English, and the publication year was limited to 2006- current. This part of the search was independently repeated by the British Dental Association's library team to validate the search methods and the number of results. The original search resulted in 8,421 articles (Table 1).

The resulting articles were transferred to the referencing software (Endnote X7 ©1988–2016 Thomson Reuters) to remove any duplicates. The title and abstracts of the resulting articles were hand-searched using the inclusion and exclusion criteria (Table 2) to identify the number of qualitative research articles available in dentistry. This resulted in 451 articles. Filtering these to the focus of dental implants resulted in 25 articles. A flowchart depicting the workflow is shown in Figure 1.

In the second part, the resulting 25 articles were appraised against the 10-point checklist offered by the Critical Appraisal Skills Programme tool (*CASP—part of the Oxford Centre for Triple Value Healthcare Ltd (3V) portfolio*) for qualitative research articles ("Critical Appraisal Skills Programme," 2014). (Table 3).

3 | RESULTS

To provide a collective report, the results are presented under the following themes.

3.1 | Reported research aims

> CASP requirement: "what was the goal of the research; why it was thought important; and its relevance"

All selected 25 articles were graded as adequate for the CASP's requirement concerning the description of the research aims and their relevance. Seventeen articles were aimed at assessing patients' views on dental implants. The subject areas (Table 4) included patients feelings about losing teeth (Meaney et al., 2017; Parahoo et al., 2019), their experiences with impaired function following tooth loss (Lantto & Wardh, 2013), what their wishes and demands were from dental implant management (Abrahamsson et al., 2017; Atieh et al., 2016; Boeskov Ozhayat et al., 2019; Cronin et al., 2009; Grey et al., 2013; Johannsen et al., 2012; Kashbour et al., 2017, 2018a, 2018b; Narby et al., 2012), their engagement with private implant treatment (Exley et al., 2012), changes in their quality of life following implant treatment (Gatten et al., 2011; Hyland et al., 2009; T. E. Nogueira, et al., 2019; R. B. Osman et al., 2014; Rousseau et al., 2014), and why some elderly patients declined dental implant treatment even if it was available (Ellis et al., 2011). One article considered dental implant knowledge and understanding of the general public (Wang et al., 2015). This included how and where they seek out such information and their opinions on its relevance to their treatment. Four out of 25 papers focussed on dentists' views on implants. The research subjects included how dentists engage patients in decision making (C. E. Exley et al., 2009), dentists' opinion about the current implant provision, what are the future needs of this treatment regime (Kashbour et al., 2018a, 2018b), and what is their position in introducing high-cost treatment options to patients (Vernazza et al., 2015). One article discussed a new dental implant educational programme and the students' opinion of the learning experience (Fatemeh S Afshari et al., 2014). Another study investigated the educational value of YouTube patient testimonials (Ho et al., 2017).

TABLE 1 Search terminology, strategy and the resulting articles

		Results				
	Search Terminology	Medline	SCOPUS	Web of Science	ASSIA	Cochrane
1	Qualitat*.mp.	281,686	842,121	596,557	112,755	14,388
2	(Focus Groups or "focus Group*").mp. [mp = title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	49,198	331,313	360,607	102,107	14,173
3	interview*.mp.	375,437	752,424	550,084	431,221	33,374
4	observation.mp	306,143	2,001,426	1,472,929	180,523	40,572
5	("reflective diary" or "reflective diaries").mp. [mp = title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	97	605	206	46	6
6	narrative.mp.	35,196	182,015	165,003	108,315	1,610
7	(conversion or discourse or documentary or text or textual).mp. [mp = title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	298,460	1,540,549	1,357,410	570,680	16,854
8	quality of health care.mp.	141,678	517,230	104,080	90,127	6,894
9	("Attitude to Health" or "Attitude of Health Personnel").mp. [mp = title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	196,270	254,272	1,125	11,777	5,704
10	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9	1,459,288	4,932,349	4,176,491	1,466,674	118,179
11	(dent$ not dentigerous).mp. [mp = title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	568,489	683,980	747,984	1,522,019	42,407
12	(endodont$ or "root canal" or periodont$ or prosthodont$ or "filling material$" or "oral surg$" or "oral health" or "oral hygiene" or caries or carious).mp. [mp = title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	224,061	289,514	182,991	25,718	13,781
13	exp Oral Surgical Procedures/	68,037	30,900	11,130	1,154	3,671
14	exp Dentistry/	402,356	129,688	646,065	28,895	14,166
15	exp Dental Implants/	23,651	49,273	46,749	4,804	2,714
16	exp Dental Implantation/	21,891	31,375	7,170	547	1,339
17	exp Radiography, Dental/	21,899	33,342	6,556	863	1,147
18	exp Anesthesia, Dental/	11,162	17,445	4,184	1628	2,780
19	(implant$ or amalgam$ or composite$ or compomer$ or restoration$ or restorative or anesth$ or anaesth$ or sedat$ or radiog$ or radiol$).mp. [mp = title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	2,025,537	5,782,428	2,507,729	518,021	75,195

(Continues)

TABLE 1 (Continued)

	Search Terminology	Results				
		Medline	SCOPUS	Web of Science	ASSIA	Cochrane
20	(tooth or teeth or molar$ or incisor$ or canine$ or cuspid$ or bicuspid$ or premolar$ or maxillofacial or maxilla$ or mandib$).mp. [mp = title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	514,916	911,642	568,267	84,149	26,949
21	19 and 20	130,756	227,295	86,425	9,002	7,430
22	exp Dental Caries/	45,693	121,725	37,854	4,859	5,255
23	Caries.mp.	58,664	128,831	42,077	5,310	6,355
24	11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 21 or 22 or 23	724,455	1,363,853	848,435	163,147	48,239
25	10 and 24	38,288	87,694	48,529	7,549	2,855
26	animals/ not humans.mp. [mp = title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	4,584,642	3,950,056	899,200	433,017	22
27	25 not 26	35,942	82,081	47,021	7,376	2,854
28	(dog or dogs or cat or cats or minipig$ or monkey$ or macaque$ or rat or rats or mouse or mice or rabbit$ or "animal stud$").mp. [mp = title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	4,122,053	9,638,863	4,010,110	503,477	13,095
29	27 not 28	35,388	69,618	41,818	7,249	2,837
30	limit 29 to English language	31,728	61,301	41,142		
31	limit 30 to yr.="2006 -Current"	18,557	38,089	31,134		2,116
32	(dental implant or implant* or implantation or osseointegration or osteointegration).mp. [mp = title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]	497,750	163,827	327,211	105,917	34,379
33	31 and 32	1941	3,319	2,639	259	263

3.2 | Reported ethical reviews

> CASP requirement: If there are sufficient details of how the research was explained to participants for the reader to assess whether ethical standards were maintained; If the researcher has discussed issues raised by the study (e.g. issues around informed consent or confidentiality or how they have handled the effects of the study on the participants during and after the study); If approval has been sought from the ethics committee

Ethical approval has become the universal and basic publishing requirement for clinical studies. All the articles have cited their approval from the relevant ethical review committee. Only a few gave the details of consent, how the data will be recorded, stored for ethical review (Kashbour et al., 2018a, 2018b; Lantto & Wardh, 2013; Meaney et al., 2017). One of them did not mention ethical approval (Ho et al., 2017), but the research was a document analysis of YouTube patient testimonial videos which appeared to be exempted from ethical approval.

3.3 | Reasons for choosing qualitative methodology

> CASP requirement: " If the research seeks to interpret or illuminate the actions and/or subjective experiences of research participants; Is qualitative research the right methodology for addressing the research goal, if the researcher has justified the research design"

TABLE 2 Criteria for articles selection

Inclusion criteria	Exclusion criteria
1. Dental/ Implants related articles. 2. 2006- current. 3. English. 4. Predominantly qualitative.	1. Reviews, systematic reviews and literature reports and summaries of published articles. 2. Quantitative articles. 3. Pseudo qualitative. a. Studies that say qualitative but are not. b. Observation (of material properties, of implant survival, comparison of test and control groups, of mucosal changes). c. Quality of materials/ implant treatment. d. Interview studies to collect survival or success or pain or satisfaction with treatment. 4. Non-human. 5. Material Studies.

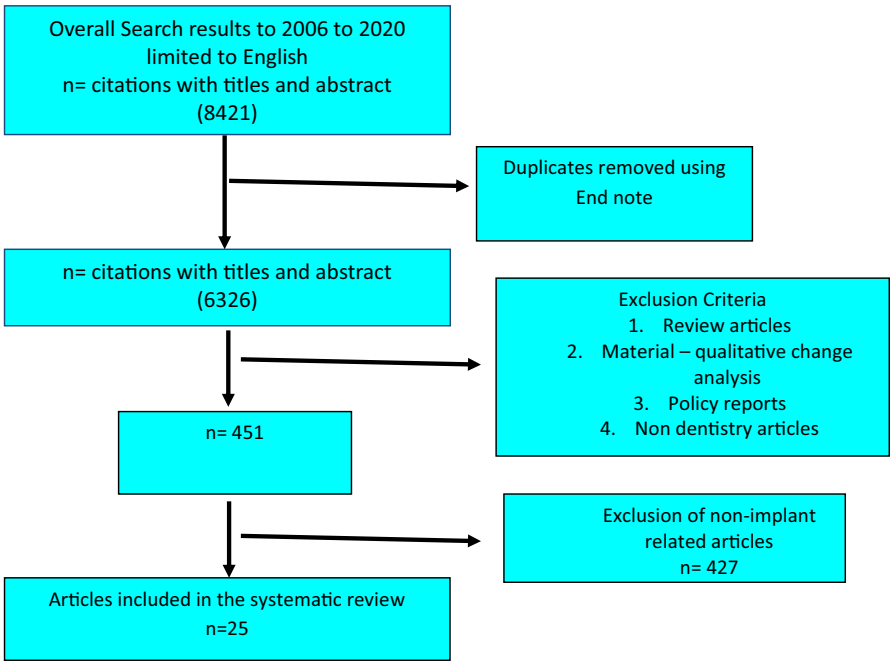

FIGURE 1 Study Identification Flowchart (Adopted from PRISMA 2009 Flow Diagram)

The researchers chose the qualitative methodology to interpret the experiences of the participants and to obtain a deeper understanding of the particular problem under investigation (Gatten et al., 2011; Hyland et al., 2009; Kashbour et al., 2018a, 2018b; T. E. Nogueira, et al., 2019). The reasons listed for choosing this methodology included exploring newly emerging trends within society (Cronin et al., 2009), and the flexibility of allowing the interviewer to explore and the interviewee to express opinions (C. Exley et al., 2012). Four of them used qualitative methods to complement their major quantitative research (Hyland et al., 2009; Osman et al., 2014; Rousseau et al., 2014; Vernazza et al., 2015). Alternatively, one author used the qualitative methodology, but expressed disagreement with the findings and recommended large quantitative studies instead (Afshari et al., 2014).

3.4 | Recruitment strategy mentioned

CASP requirement: "If the researcher has explained how the participants were selected; If they explained why the participants, they selected were the most appropriate to provide access to the type of knowledge sought by the study; If there are any discussions around recruitment (e.g. why some people chose not to take part)"

Participants were either the patients who attended for dental implant treatment (Abrahamsson et al., 2017; Gatten et al., 2011; Grey et al., 2013; Hyland et al., 2009; Johannsen et al., 2012; Kashbour et al., 2017); or dentists who undertook either the clinical procedures or learned about the subject (Afshari et al., 2014; Kashbour et al., 2018a, 2018b). Purposive sampling was the commonly employed method (Cronin et al., 2009; Kashbour et al., 2018a, 2018b; Meaney et al., 2017; T. E. Nogueira, et al., 2019; Parahoo et al., 2019; Rousseau et al., 2014; Vernazza et al., 2015; Wang et al., 2015). Two of the studies started with an initial theoretical sampling developed from a larger group of participants of a quantitative study and then adding to the sample based on the data pooling (Lantto & Wardh, 2013; Osman et al., 2014). Snowballing was mentioned in one study, where the initial participants suggest further possible participants (Meaney et al., 2017). Inclusion and exclusion criteria were discussed in four studies (Boeskov Ozhayat et al., 2019; Gatten et al., 2011; Grey et al., 2013; Kashbour et al., 2017), to include a wider representation of variables such as age (Cronin

TABLE 3 The CASP criteria

1	Clear statement of the aims
2	Is methodology appropriate?
3	Was the research design appropriate?
4	Was the recruitment strategy appropriate?
5	Was the data collected in a way that addressed the research issue?
6	Has the relationship between researcher and participants been adequately considered?
7	Have ethical issues been taken into consideration?
8	Was the data analysis sufficiently rigorous?
9	Is there a clear statement of findings?
10	How valuable is the research?

TABLE 4 Statement of aims

Participants	Subject	Number of articles
Patients	Needs and demands	12
	Impaired function	1
	Effects of rehabilitation	1
	Experience post treatment	5
	Why dissatisfied with denture	1
Dentists	Decision making	2
	Approaches, Current situation, future needs	1
	Student needs	1
General Public	Views about implants—available knowledge	1

et al., 2009; Johannsen et al., 2012), gender, socio-economic variations (Parahoo et al., 2019; Rousseau et al., 2014; Vernazza et al., 2015) and different types of disabilities(Lantto & Wardh, 2013) such as functional, mental and elderly. Dropping out of selected participants and losing interview recordings were also reported (Cronin et al., 2009).

3.5 | Methodology, data collection and analysis of data

Details of data collection methods and the rigorousness of analysis are listed in Table 5. Eighteen studies used in-depth semi-structured interviews, six used focus groups, and one employed the document analysis method. Interview set-up such as choosing a quiet and convenient space and the use of a topic guide were discussed in all studies. Two of them modified the questions in the topic guide following the responses of previous participants (Abrahamsson et al., 2017; Meaney et al., 2017). All the interviews and focus groups were tape-recorded and verbatim transcribed. The researchers indicated that data saturation limited the number of interviews or focus groups.

Different coding methods such as line by line, focussed coding, hierarchical have been used and 13 of them used Nvivo software. Grounded theory was used by eight articles, and 21 of them used thematic analysis. Three authors have used the thematic analysis but did not state "thematic" in their description (Abrahamsson et al., 2017; Boeskov Ozhayat et al., 2019; Gatten et al., 2011).

Qualitative data analysis can be of two broad categories (Braun & Clarke, 2006). In the first category, the analysis starts with a predefined set of theories grounded from previous research. Nearly half of the selected studies have used the *grounded theory* approach to build on the theory by the constant comparison of resulting themes. The second category is the thematic analysis (Braun & Clarke, 2006), where the meanings identified from the data are thematised. In the appraised studies, the thematic methods suggested by previous researchers were used (Braun & Clarke, 2006; Miles & Huberman, 1994) which is described in Table 6. Two articles have stated that they used latent analysis methods. Inductive methods to identify themes were preferred over the deductive approach (Johannsen et al., 2012).

The use of triangulation methods to validate the study has been described in 19 papers. These methods were involving a wider team, and independent coding and analysis, conducting independent analysis by at least two researchers, peer debrief or inter-rater reliability (Burnard et al., 2008). Adherence to the published criteria (Dixon-Woods et al., 2004) and consolidated criteria for reporting qualitative research, COREQ (Tong et al., 2007), were also quoted to prove rigour (Table 5). Seven articles attempt to justify the researcher's role, and also indicate whether they were passive (Afshari et al., 2014), did not take part in active treatment (Abrahamsson et al., 2017; Boeskov Ozhayat et al., 2019; Narby et al., 2012; Osman et al., 2014) or were not part of the clinical team (Hyland et al., 2009; Johannsen et al., 2012). The results section in most of the articles were referenced with quotes from the participants.

3.6 | Content value of the research

The research aims of the reviewed articles are listed in Table 4. The majority of the articles evaluated (i) patients' views on tooth loss, (ii) how they receive information about dental implants and (iii) their experiences with dental implant management. Four of the articles evaluated the dentists' view on learning about dental implants and their opinions on dental implant provision.

Researchers observed that the patients interpreted *tooth loss* as a deviation from normality (Grey et al., 2013) as it changed their appearance and affected their eating and speech. Social withdrawal, a feeling of guilt and an enormous change in self-image were reported by the patients as the detrimental effects of tooth loss (Hyland et al., 2009; Narby et al., 2012).

Patients who lost their teeth expressed mixed views towards dental implant treatment. Some of them sought dental implants and others declined the same. Patients' decisions for dental implant treatment depend on their age, whether they are from an urban or rural background and the relative cost of implant treatment. One of the studies identified that the older age group patients (>70 years)

TABLE 5 Analysis of data

Author and year	Data collection method	Data analysis	Triangulation
Cronin M et al. (2009)	22 Semi-structured interviews	Inductive process to arrive at themes	data analysis was undertaken involving both researchers
Exley et al. (2009)	3 Focus groups and surveys (in future tense—not clear if it was completed study)	comparative method	None mentioned
Hyland R etal (2009)	66 Semi-structured interviews	Thematic Content analysis	None mentioned
Ellis et al. (2011)	Multi centre—5 Focus groups	Thematic analysis	For each transcript, at least two researchers coded and compared the data and resolved discrepancies when they occurred; thus, inter-rater reliability was established.
Gatten et al. (2011)	6 Focus groups (3 per each category)	mixed-method approach using both inductive (e.g. grounded theory) and a priori (e.g. theory driven from the literature) procedures.	All the transcripts were reviewed by two individuals
Exley et al. (2012)	27 semi-structured Interviews	constant comparative method	None mentioned
Johannsen A et al. (2012)	interviews	Conventional—latent content analysis (Burnard 1996, Graneheim & Lundman 2004) and inductive category development of meaning units (Hsieh & Shannon 2005)	All the authors were involved in analysis—till synthesis
Narby B et al. (2012)	17 Open interviews	constant comparative method described by Glaser and Strauss (modified grounded theory)	interpretation was discussed between all the authors
Grey EB et al. (2013)	Telephone interviews	Thematic—Braun & Clark 2006	thematic interpretation was discussed between all the authors.
Lantto A et al. (2013)	Open conversational interviews	Grounded theory—constant comparative method	Calibration was carried out in dialogue between the author and the co-author throughout the coding process.
Afshari et al. (2014)	Two Focus groups and survey	None mentioned Participants opinions were discussed descriptively	None mentioned
Osman et al. (2014)	In depth semi-structured interviews	focused coding (Pope & Mays 2000); says constant comparative (Hallberg 2006) once and then thematic analysis (Burnard et al. 2008) at another instance	the data analysis was validated by a third party, a process known as peer debrief or stimulate inter-rater reliability Burnard et al., 2008; Purposive sampling and multiple coding were employed to protect against bias and enhance the reliability of the research (Stewart et al., 2008)
Rousseau et al. (2014)	Semi-structured interviews	constant comparative thematic analysis (Glaser 1965, Strauss 1987)	Wider research team—involving social researchers
Vernazza et al. (2015)	interviews	constant comparative thematic analysis (Glaser 1965, Strauss 1987)	wider research team (which included a health economist, dentists, a sociologist and a psychologist)
Wang et al. (2015)	6 focus groups	Inductive method Grounded theory (Glaser 1992) Meaningful "text units" were extracted manually by line-by-line coding	thematic interpretation was discussed among and cross-validated by all the authors
Atieh MA (2016)	15 Interviews and survey	Adherence to COnsolidated criteria for REporting Qualitative research (COREQ) (Tong et al., 2007) inductive and content analysis was conducted to identify themes within the interview transcripts (Burnard et al., 2008) Thematic—(Braun & Clark 2006)	None mentioned
Abrahamsson KH et al. (2017)	15 Open-ended interviews	Grounded theory, Hierarchical Coding	None mentioned
Ho A et al. (2017)	202 You tube videos—document analysis	Data analysed statistically and qualitatively	Inter-examiner reliability mentioned for statistical analysis but not for qualitative part

(Continues)

TABLE 5 (Continued)

Author and year	Data collection method	Data analysis	Triangulation
Kashbour et al. (2017)	38 face to face interviews	Thematic—Braun & Clark 2006	The wider research team included a social scientist, two clinical researchers; all were involved throughout the analysis process. Dixon-Woods et al.'s criteria used to monitor quality of the study(Dixon-Woods et al., 2004)
Meaney et al. (2017)	Semi-structured interviews	Five staged thematic analysis with mapping the themes Braun & Clark 2006	Analysis was done by primary author and then reviewed by the co authors
Kashbour et al. (2018)	8 In depth semi-structured interviews	Thematic analysis (Braun & Clark 2006) Dixon-Woods et al.'s criteria followed.	multiple observers to achieve analyst/ investigator triangulation
Kashbour et al. (2018)	38 semi-structured face-to-face and telephone interviews with 34 participants	generic qualitative approach, which is also known as interpretive description (Caelli, Ray, & Mill, 2003; Thorne, Kirkham, & MacDonald-Emes, 1997. Thematic analysis Braun & Clarke, 2006; Rapley, 2017 criteria developed by Dixon—Woods et al.	multiple observers/the wider research team is to achieve analyst triangulation and to look at the data from different perspectives, avoiding "blind spots" and enabling a more comprehensive analysis (Patton, 1999).
Nogueira TE et al. (2019)	2 or 3 Focus group	Thematic—Braun & Clark 2006	analyst triangulation (Patton, 1999)
Parahoo R et al. (2019)	15 semi-structured interviews	thematic analysis as recommended by Miles and Huberman spider diagrams and mind maps	Two researchers read the transcripts separately to generate themes
Boeskov et al. (2019)	35 semi-structured Interviews	Inductive approach of grounded theory Principles of a COREQ by Tong et al	

TABLE 6 Thematic analysis methods mentioned in the appraised studies

Braun and Clark (Braun & Clarke, 2006)	Miles and Huberman (Miles & Huberman, 1994)
1. Familiarising with the data. 2. Generating Initial Codes. 3. Searching for themes. 4. Reviewing themes. 5. Defining named themes. 6. Producing the report.	Matrices (intersection of two lists in columns and rows)and networks (nodes connected with links or lines).

declined dental implants as they had concerns about the surgery and having to cope with the unknown. The horror stories they heard about both the pain and about the procedure also influenced their decision (Ellis et al., 2011; Meaney et al., 2017). If they were offered implants, these patients developed second thoughts. They believed that either the dentist was not sympathetic about their age or that the dentist was overselling the procedure (Ellis et al., 2011). Patients were aware of the high cost of dental implant treatment and generally satisfied that the costs were justified (Abrahamsson et al., 2017). Some patients viewed implants as a cosmetic luxury as they are only available on a private basis (Exley et al., 2012). Patients also perceived implant treatment as beyond their budget, due to both the complexity and the requirement of high maintenance over several years (Nogueira, et al., 2019). Other patients were not willing to pay for an "unknown product" and wished to try the "merchandise" as they might do with other major purchases in life (Osman et al., 2014).

Patients living in rural areas had low expectations. This was related to inter-connected factors (i) lack of awareness by patients locally which led to lesser demand for dental implants, and (ii) dentists, in turn, did not provide dental implants due to lesser demand (Boeskov Ozhayat et al., 2019). Another study supported this opinion by reporting that dentists developed a pattern of providing less or giving out distorted information about the provision of advanced replacement of teeth, even when the patients wished to know about dental implant treatments available (Vernazza et al., 2015). In addition, Osman et al., 2014 identified that some patients declined dental implant treatment as they were happy with their existing prosthesis, for example patients already wearing satisfactory maxillary dentures declined maxillary implants knowing that this may improve the retention.

Information about dental implants for patients will frequently come either from social media or from friends and family (Kashbour et al., 2017, 2018a, 2018b; Nogueira, et al., 2019). Patients may not receive the correct information and will be either less informed or more likely misinformed by accessing such sources before they attend dentists for treatment. Patient testimonial videos were identified as providing misleading ideas on pain and life expectancy associated with dental implants (Ho et al., 2017). Statements such as "implants are better than real teeth," "permanent treatment that lasts for life," and a video where a patient advocates the extraction of all teeth with periodontal disease and replacement with a dental implant bridge were recognised by the researchers as not only misleading but also potentially dangerous.

Researchers noticed that the patients valued implant information most highly if it is received from clinicians (Kashbour et al., 2017). This information may be from dentists, dental staff, or from learning materials they see in the dental waiting room while they were visiting for other dental treatments (Wang et al., 2015).

Patient satisfaction was unanimously high with dental implants. The patients expressed that they regained normality of life after dental implant treatment. Normality was related to their improved

confidence and their ability to taste food (Narby et al., 2012; Nogueira, et al., 2019). Implants were seen as an integrated body parts, leading to enhanced quality of life (Johannsen et al., 2012; Lantto & Wardh, 2013). However, affordability of treatment was highlighted as important in another study (Atieh et al., 2016). Fee-paying patients recommended that if the payment was spread over a period of time, that is in instalments, this would make implant provision more accessible for a larger sector of the population (Osman et al., 2014). Hearing horror stories before treatment made patients anxious. Such patients reported that this unpleasantness was overestimated following treatment (Kashbour et al., 2018a, 2018b). Patient satisfaction was also related to the prosthesis outcome, that is ease of handling (Osman et al., 2014).

Complications during and after implant treatment can give rise to patient dissatisfaction at a later stage. Patients will have invested time and money into the procedure, will expect a return on their investment. Some patients were stressed when the problems occurred and exhibited shame and guilt. There were feelings of disappointment if they experienced problems especially if they had maintained regular contact with the dentist and the team whilst the treatment was being done (Abrahamsson et al., 2017). Researchers identified that patients who received misleading information such as "just like having natural teeth" in the treatment planning stage, will treat implants like natural teeth and therefore likely to make the mistake of not maintaining them via cleaning regimes (Grey et al., 2013; Wang et al., 2015). Alternatively, patients who were well informed by the dentists realise that they are responsible for looking after the dental implants. They understand that they may potentially be the cause of dental implant complications. They did not question the dentists' skills or management (Narby et al., 2012). In addition, if the clinician was able to solve the patient demands in a satisfactory manner, then it led to an improvement of the professional-patient relationship (Nogueira, et al., 2019).

3.7 | Dentist factors

Four articles investigated the dentists' views related to dental implant management. One study identified the major reason for referral was because the general practitioner did not perform implant treatment, and this was not due to fear of difficulty (Narby et al., 2012). Other studies recognised that the dentists recommended continued learning in dental implants (Cronin et al., 2009) and viewed specialist training as an important milestone for dental implant provision (Afshari et al., 2014).

4 | DISCUSSION

This current review analysed the qualitative research articles in the subject area of dental implants published from 2007 to 2020. The number publications still remain low during these years, in comparison with the total number of publications in dentistry. The frequency of publication ranged from 0 to 4 articles per year (Appendix A1), and 4 out of the 25 selected articles were published in non-dental journals (Appendix A2). Twenty-three articles used the qualitative methodology and the remaining two used the qualitative methodology as an adjunct to a major quantitative study (mixed methodology).

In contrast to the previous appraisal, the quality of the articles included in the current review was adequate, as many of them met the CASP requirements (Masood et al., 2011). This improvement in quality may be attributed to the demanding publishing requirements of high impact academic journals. The editorial process in most of the current journals requires a structured presentation including a statement of aim, the value of the subject, methodological rigour, and a detailed discussion of positive and negative aspects of the study. Finally, ethical approval has become a recognised standard (Newson & Lipworth, 2015). These mandatory requirements have resulted in the researchers highlighting the details of methodology such as sampling, data collection methods and triangulation. However, they fail to describe how did they do the analysis and developed the theories, which is the essence of qualitative research. One researcher stated that they used the constant comparative method in the introduction and thematic analysis in methodology (Osman et al., 2014). Conversely, the results and discussion confirmed that they used thematic analysis. While both the theories of Grounded Theory and thematic analysis may be used in dentistry, the authors should exhibit their understanding by explaining why they chose one method over the other.

4.1 | Content analysis

The cost of dental implant treatment was reported to be a major factor for patients. Apart from the two articles, all the studies were conducted on patients attending teaching hospitals, or secondary care set-ups where treatment cost was either nil or subsidised. Transferring the views of these patients to the general population who receive dental implant treatment on a private fee-paying set-up may not be appropriate (Gatten et al., 2011). One study raised the controversy of providing implants in a state-funded sector. The authors wrote that dental implants are seen as a cosmetic luxury and therefore not readily available in primary care. However, the global consensus is that implant-supported denture should be the first line of management for the edentulous mandible as it improves the quality of life overall other treatment regimes. (Exley et al., 2012). Another conflict concerns the age of patients. Contradicting views of one group of the older population accepting the status quo (Meaney et al., 2017) and another affluent group of older seeing tooth loss more problematic (Vernazza et al., 2015) were reported. This observation suggests that the age of the patient requires to be factored with the financial background while planning for dental implant treatment.

The patient satisfaction factor relates to the information received about dental implants. Misleading pieces of information from social media together with an enthusiastic dentist's overselling attitude can motivate the patients to have implant treatment without

understanding future maintenance and potential complications. In some instances, over motivated patients tend to ignore or miss the important dialogue clues from the clinician. These patients may consider dental implants as a panacea for the treatment of all cases of missing teeth (Wang et al., 2015).

Medical tourism and the associated challenge due to differing legislative practicing requirements between the patient's residing country and the country where the treatment was performed were identified in one study (Wang et al., 2015). Despite being conducted in a regional set-up, the questions raised by the researchers about the quality of service, possible risks and inconveniences are valid and can be transferred to be a global issue/problem.

The rapidly growing dental implant industry presents both opportunities and challenges (Wang et al., 2015). The review identified that all the themes revolve around the focus of patient communication and information they receive before dental implant treatment. Suggestions are provided to reduce those misbeliefs of patients generated by the information provided before the start of implant treatment. The inclusion of dental team members other than dentists is seen as a useful method to eliminate any misunderstandings.

Researchers identified the gaps in published guidance. One of these is the criteria related to the success of dental implants (Atieh et al., 2016). The original criteria were 1986 by Albrektsson et al. which was based on osseointegration and survival of dental implants. Additional factors such as prosthetic stability and absence of disease were added to this by many authors Schnitman & Shulman 1979; Albrektsson et al., 1986; Smith & Zarb 1989; Zarb & Albrektsson 1998). However, no major updates were made in the last two decades. As dentistry has become a patient-centric service, the success criteria based on technical success or survival may not be adequate. This should involve patient inputs and dentists' views in addition to the technical aspects. This will need more theories to be identified and therefore need more qualitative research. (Atieh et al., 2016). This should be facilitated by expanding opportunities for the researchers to practice truly qualitative research, that is to be rebellious not conforming to the norms or standards, and by recognising their work by making qualitative inclusive publishing guidelines.

4.2 | Strength and weakness of the CASP approach

The use of CASP tool for this study offered the following advantages and disadvantages. The tool provides a 10-point checklist to focus on the quality of the published material; however, the qualitative assessment of the actual content required a subjective evaluation.

A true qualitative researcher will not conform to any fixed guidelines due to the flexibility of the methodology. However, as health research is evidence-based, researchers should highlight the rigorousness in their methodology and take support from the previously published guidelines. This grey area influenced the review process. Also, more publications will elevate the quality in the evidence-based ladder, for example ability to undertake a meta-analysis.

4.3 | Topics for future studies

This analysis has reviewed the information that is currently available and indicated the possible future research avenues. Future studies in this area may include

- The understanding of the challenges faced by the clinicians in the learning and implementation of dental implants in their clinical practice
- How dental education courses can assimilate the teaching of dental implants in the curriculum
- How to increase the effectiveness of other members of the dental team in increasing the success of dental implant practice.

In-depth interviews and focus groups were the most used methodologies in the reported studies. While social research methods such as large ethnographic studies may not be easy in dental research, other methods such as document analysis and participant observations can be explored.

5 | CONCLUSION

The review identified the following important findings.

- While the quantity of qualitative research in dental implants remains low, the quality has improved in the past two decades,
- There is a large gap in the understanding of patients' and dentists' views on dental implant management. Few examples are the non-availability of patient inclusive dental implant success criteria and dental implant maintenance guidelines for general practitioners.

AUTHOR CONTRIBUTION

Sivakumar Jayachandran: Conceptualization (lead); Data curation (lead); Formal analysis (lead); Investigation (lead); Methodology (lead); Project administration (lead); Supervision (equal); Validation (equal); Writing-original draft (equal); Writing-review & editing (equal). **Kirsty Hill:** Conceptualization (supporting); Methodology (supporting); Project administration (supporting); Supervision (equal); Validation (equal); Writing-original draft (supporting); Writing-review & editing (supporting). **Anthony Damien Walmsley:** Conceptualization (supporting); Data curation (supporting); Methodology (supporting); Project administration (lead); Supervision (lead); Validation (supporting); Visualization (supporting); Writing-original draft (equal); Writing-review & editing (equal).

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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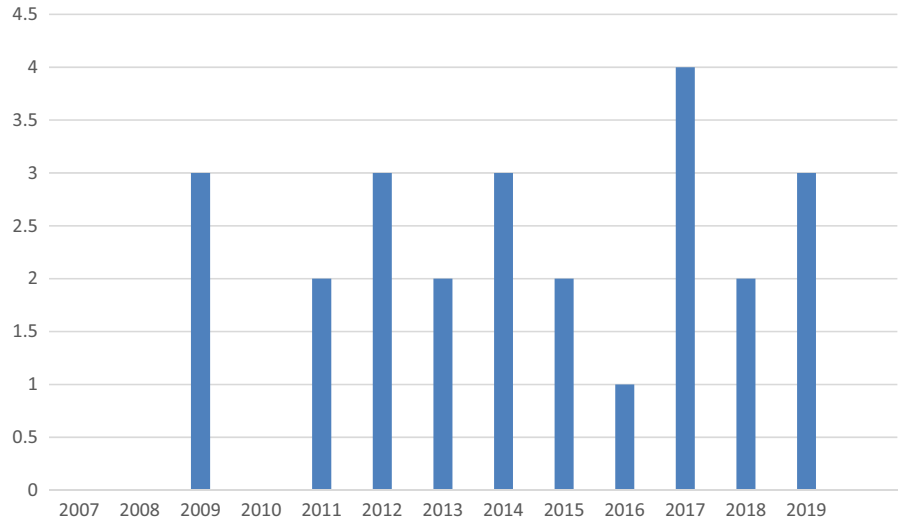
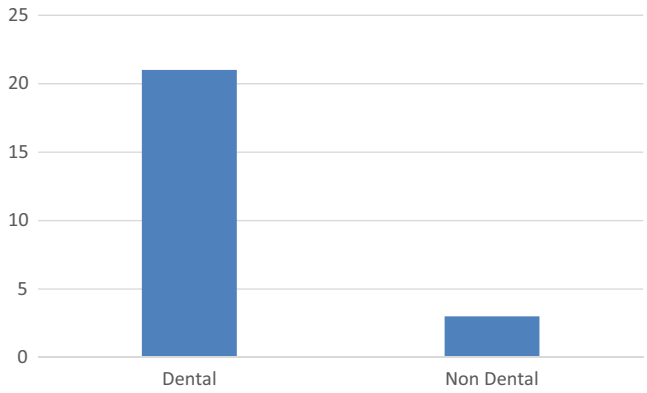
APPENDIX A1

No. of articles n = 25



APPENDIX A2

Number of Publications