

## Trends In Periodontal Research In India - A Review

### Abstract

Periodontal diseases have affected mankind since the earliest of times. As there is a gradual decline in the trend of caries, prevalence of Periodontitis has considerably increased over a period of time. Periodontal research has progressed tremendously worldwide. In India in spite of increased periodontal research proper documentation and dissemination of information is lacking. This is a major setback in the current era of evidenced based clinical practice. Several Indian studies in the field of periodontology have been analysed and reviewed. This will aid in generating a data base of Indian periodontal research. Hence In this review, an attempt is made to analyze documented periodontal research and its relevance in present scenario in India.

### Key Words

Antimicrobial therapy, epidemiological studies, periodontal research, regenerative therapy.

### Introduction

Research is a quest for knowledge through diligent search (or) investigation (or) experimentation aimed at the discovery and interpretation of new knowledge.<sup>[1]</sup> Research inculcates scientific and inductive thinking and it promotes the development of logical habits of thinking and organization. Information technology is playing a major role in research in terms of data acquisition, interpretation and dissemination of results. It had revolutionized the field of bioinformatics. This has spurred increased research activities worldwide including India.

Research in India is still in its infancy. There is urgent need for reorganization of the valid research data in India. This will help in formulating national dental health care policies and evidence based clinical practice. Most of the research projects - be it epidemiological, preventive, experimental, clinical or non-clinical are of short-term nature and academic oriented. Fewer long term studies are available.<sup>[2]</sup> Most of the multinational companies present in India carry out periodontal research to propagate their innovative products; however, their results may sometimes be biased. In this review an attempt made to analyze periodontal research and its effect on periodontal practice in India.

### Progress of Periodontal Research and Practice in India

Until 1960, the concept of specialist was not developed in India. With the commencement of postgraduate education in India in 1959, Orthodontics achieved a status of specialty as it was something new concerned with aesthetics. Periodontics as a specialty received very little attention during 1960-70s probably because little was known about the pathogenesis and management of periodontal diseases. The scientific advances made since then have constructively helped us to understand the disease and alter our treatment accordingly. The dental profession has now fully recognized the importance of periodontics as a clinical specialty.<sup>[3]</sup>

### Research Facilities and Activities.

Research facilities and activities are absolutely essential for the progress of the dental health care system in India. Most of the research is carried out in dental institutions as a part of post graduate studies. The modern studies require sophisticated equipments. This requirement has resulted in a wide knowledge gap between the developed world and the institutions located in the less developed countries. Uniform modernization of laboratory facilities in all the institutions is an issue that has to be addressed at war footing. This will help

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promote quality research all over the country.

Deficiency in skilled, trained, competent and willing technicians makes the maintenance and efficient use of facilities difficult. Most of the sophisticated instruments are imported and that spares and trained troubleshooters often have to fly in from overseas. This requirement has to be fulfilled.<sup>[2]</sup> The migration of skilled researchers and technicians to well developed countries in search of lucrative jobs is another issue that the government of India need to address. National policies which make the entire dental practice and research lucrative should be formulated to prevent the brain drain. But care should be taken against spurious commercialization of research. Funding of research is another important issue. Several funding agencies are now available from department of public health. Indian medical council for research is one of the premier funding agencies with several institutes all over the country.<sup>[4]</sup>

International Clinical Dental Research organization was established in 2008 with the objective of promoting dental research in India. It is dedicated to motivate clinicians & academicians to take more interest in clinical research. It also provides funds to support research studies / dissertations<sup>[5]</sup>. The progress of the profession is very much dependent on the research activities. But the deficiency of technical knowledge of attaining funds among researchers has led to disappointment and loss of desired results. Health department has the responsibility to encourage the interested researchers by simplifying the funding regulations and reduction of outright rejections of research proposals. Basic training should be given to all health science faculties in writing a proposal, carrying out the research, fund management and publishing results.

Health Departments in most of the states give a low priority to dental research work. Meager funds are allotted to Dentistry. These funds do not fulfill the required objectives due to improper handling. A huge deficit exists between the amount of research work carried out and published work. This issue needs to be addressed<sup>[5]</sup>. In spite of deficiencies periodontal research has been progressing steadily. Large number of dissertations has been written during the last four decades on various aspects of Periodontology (see **Table 1**).

Many multinational companies have excellent research facilities in India, but very little research work is published by them. Ayurvedic companies are also conducting research on their products and their works are not regularly published. Several in vitro studies and animal studies are also being conducted all over the country.<sup>[6]</sup>

**Research Activities in various fields of Periodontics** - Most studies seem to have focused on research topic relevant to the Indian environment. Topics covered are mentioned in the **Table no. 1**

**Etiological factors:** Great deal of research work has established multifactorial nature of periodontal disease and mechanism leading to loss of attachment apparatus.<sup>[7],[8]</sup>

**Risk factors:** Many risk factors modify the response to periodontal diseases

Table 1: Dissertation Topics from Indian Institutions.

No	Research Topics
1	Basic Science
2	Oral Hygiene
3	Epidemiology
4	Etiology
5	Systemic Factors
6	Preventive Periodontics
7	Treatment Modalities
8	Periodontal medicine

Table 2: List of risk factors

Risk Factors For Periodontal Disease	
1.Tobacco Smoking	
2.Diabetes	
3.Microbial Deposits	
4.Systemic Factors	
5.Poor Oral Hygiene	
Risk Determinants	
1.Genetic Factors	
2.Age	
3.Gender	
4.Socioeconomic Status	
5.Stress	
Risk Indicators	
1.Hiv/aids	
2.Osteoporosis	
3.Infrequent Dental Visits	
Risk Markers	
1.Previous History Of Periodontal Disease	
2.Bleeding On Probing	

(**Table 2**).

In India, there has been an explosion of interest and research in this area. Many dissertations & researches on risk factors in the Indian scenario have been conducted and published<sup>[9],[10],[11]</sup>

**Epidemiology:** Many scattered epidemiological studies have been carried out in India. But results have been varied and conclusion cannot be drawn. (**Refer Table 3, 4, 5**)

**Oral health in India:**

A multicentered oral health survey was conducted in India in the year 2004 under a collaborative programme by Government of India and WHO. Few of well documented studies have been shown in the **Table 5**.

**Plaque Control:**

The Indian system of medicine has given great importance to oral hygiene as an essential part of the general health. Many

Table 4: Various Epidemiological Studies Conducted in India.

Sr No	Author	Year	Place	Age Group	CPI score in percent				
					0	1	2	3	4
1	Desai	1986	Gujarat	-	0.00	0.00	12.60	67.00	21.00
2	Shenoy	1989	Bangalore	15-64	96	37	35	23	27
3	Shrinivas	1989	Andhra	-	2	2	37	40	19
4	Anil	1990	Trivandrum	10-15	3	18	68	9	2
				35-44	1	8	14	44	33
5	Sunitha	1993	Varanasi	35-44	4.10	4.70	4.10	8.10	2.90
				65-74	8.50	3.70	16	7.30	13.0
6	Maity	1994	West Bengal	15-19	4.30	24.00	72.00	0.30	0.00
				35-44	0.70	0.80	88.00	21.00	0.30
				65-74	0.00	0.00	69.00	28.00	2.90
7	Maity	1995	West Bengal	15-19	4.30	24.00	72.00	0.30	0.00
8	Rao	1995	Varanasi	15-44	16	43	38	1.60	0.20
				35-44	8.50	15.00	48	17	12
				65-74	0.00	0.00	9.80	12	78
9	Joseph Cheru	1996	Trivandrum	15-64	8.50	15.00	48	17	12
10	kurien	1996	kamataka	15-19	0.00	5.30	87.00	6.10	1.50
				35-44	0.00	0.00	25.00	40	35
				65-74	0.00	0.00	9.80	12	78
11	Shah	1997	Ahmadabad	15-19	4.40	24	72	0.20	0.00
				35-44	53	12	72	18	8.20
12	Maity	1998	West Bengal	30-44	41	0.80	77	20	0.30
				45-64	0	2	71	27	24
				>65	0	0	68	28	3.30

people do not use tooth brushes but they use miswak sticks or fingers to clean their teeth (**Refer table 6**). However, in urban and semi-urban areas, tooth brushes are slowly replacing traditional methods. Effective employment of public health tools are required to improve the understanding and awareness of the results of research among general public. This could help translate research into practice.

Studies on indigenous herbs like neem, turmeric, miswak, pomegranate etc have gained importance in the recent years. Research on various interdental aids, dentifrices, mouth rinses & indigenous tooth cleansing methods are being conducted. This has resulted in development of quality indigenous products & has brought down the cost factor which is an important concern in developing countries.

**Therapeutic treatment modalities**

Table 3: Various Epidemiological Studies Conducted in India.1 [\*M-Male], [\*F-Female]

No	Author	YEAR	Place	Sample Size	Age Group	Gingivitis%	Periodontitis%
1	Marshall & Shourie	1947	Lahore	1054	09-17	99.40	-
2	F.S. Mehta & Sanjana	1953	Bombay	2219	18-55	100.00	-
3	J.C. Greene	1960	Bombay - Urban Rural	1613	11-17	96.90	-
4	S.P. Ramjford	1961	Bombay - Urban Rural	1161	11-17	100	2.2
				159	19-30	100	42.40
5	O.P.Gupta	1964	Trivandrum	155	11-20	90.30	16.80
				275	21-30	96.70	55.60
				153	31-40	100.00	87.60
				74	41-50	100.00	94.80
				43	51-60	100.00	94.80
				33	61-70	100.00	100.00
				25	71-80	100.00	72.20
6	T.N. Chawla	1963	Lucknow	259	12-17	100.00	80.00
				449	18-23	100.00	91.10
				292	24-30	100.00	22.31
7	M.K. Basu and Dutta	1963	Calcutta	M 242	12-17	100.00	74.51
				141	12-17	100.00	91.32
				173	18-23	100.00	34.60
				F 237	24-30	92.70	40.82
				98	12-17	98.30	93.81
				97	18-23	99.60	63.11
8	D.C. Miglani and Sharma	1965	Government General Hospital, Madras	M103	15-20	81.85	86.27
				153	21-25	88.89	86.90
				99	26-30	94.95	71.170
				F 41	15-20	85.37	83.33
				36	21-25	88.89	88.46
9	M.K. Basu and Dutta	1965	Calcutta	775	12-17	93.70	45.00
				947	18-23	98.70	64.40
				1396	24-30	99.60	44
10	Roy B.C.	1965	Kirke Poona Industrial Workers	659	19-55	100.00	64
				2040	19-55	100.00	11.45
				1200	19-55	100.00	37.85
11	S.L. Mangi	1966	Rural, Madhya Pradesh	M 358	16-20	98.90	50.79
				317	21-25	99.40	7.75
				315	26-30	100.00	78.63
				212	31-35	100.00	92.20
				220	36-40	100.00	92.30
				154	41-45	100.00	88.90
				117	46-50	100.00	18.65
				67	51-55	100.00	39.13
				F 178	16-20	100.00	64.54
				154	21-25	98.90	82.50
				185	26-30	87.80	90.55
				110	31-35	100.00	83.40
				120	36-40	100.00	89.47
				74	41-45	100.00	100.00
				91	46-50	100.00	12.00
19	51-58	100.00	38.60				
37	>56	100.00	95.30				
12	Boghani	1971	Gujarat	9837	15-65	68	95.50
13	Ramachandra	1974	Madras, Rural	6547		92.60	88.60
			Urban	1536			
14	Thaha	1986	Trivandrum, Urban, Rural	6500			

Table 6: Indigenous Oral Hygiene Methods in India<sup>13</sup>

(A) Plants and Their Parts
1. Leaves:
Mango (Mangifera Indica)
Ixora Coccinea L
Cashew (Anacardium Occidentale)
2. Twigs and Stems:
Babul (Acacia Arabica)
Ixora Coccinea L
Neem (Azadirachta Indica)
Eugenia Corymbosa
Jatropha Carcas L
Banyan(Ficus Bengalensis)
3. Fruits:
Coconut and its parts
4. Barks:
Walnut (Juglans Regia)
(B) Charcoal and Modifications
1. Charcoal peices ground on stones
2. Charred paddy husk - Carbon from paddy husk (Activated Carbon)
3. Burnt charcoal shell powder
4. Carbon collected on vessels used for boiling water
5. Burnt tobacco and snuff
6. Modification of above mentioned materials with the addition of salt, pepper powder etc.
(C) Miscellaneous
Sand
Brick Powder
Ash
Coal Powder
Common Salt

Table 7: Non surgical Therapy

Scaling and root planing
Elimination of Iatrogenic factors
Antimicrobial therapy- Systemic and local drug delivery system
Occlusal therapy
Photodynamic therapy
Ozone therapy

Table 8: Surgical Therapeutic Modalities – Objectives

Elimination of Gingival Inflammation
Elimination of Periodontal Pockets
Cessation of Bone Destruction
Re-establishment of Gingival Architecture
Regeneration of Periodontal Tissues
Lasers
Implants

Table 5: Prevalance data of periodontitis from various studies done on Indian population.<sup>12</sup>

Year	Author	Sample size	Population	Age	Periodontitis definition	Prevalence of periodontitis in percentage
2000	Doifode et al	5061	Urban	0-60	N.A.	34.8
2000	Jagdeeshan et al	912	Field survey rural women	>15	N.A	20.63 - moderate 25.6 - severe
2004	Bali et al	310 per region	Urban Rural	5-12 35-44 65-74	CPITN	17.5 - moderate 7.8 - severe (35-44) 21.4 - moderate 18.1 - severe (65-74)
2004	Ranganathan et al	1000	Urban HIV males	31-40	NA	31.6
2004	Ranganathan et al	1000	Urban HIV females	21-30	NA	22.6
2005	Sood et al	1000	Field survey	NA	CPITN	29.1 - moderate 12.5 - severe
2005	Singh et al	1000	Field survey	>15 years	CPITN	39.4 - moderate 16.9 - severe
2005	Singh et al	500	Urban field survey	>15	CPITN	43.5 moderate, 22.9 severe
2005	Singh et al	500	Rural field survey	>15	CPITN	43.2 moderate 22.9 severe
2007	Ranganathan et al	136	Urban HIV population	29.2 ± 4.9	CPITN	86
2007	Vandana et al	1029	Periodontics OPD	15-74	CPITN	27.2
2007	WHO Arunachal pradesh	3200	Field survey	12-15 35-44 65-74	WHO	15 moderate 2.6 severe(35-44) 18 moderate 0.6 severe(65-74)
2007	WHO Delhi	3200	Field survey	12-15 35-44 65-74	WHO	34 moderate 1 severe(35-44) 1.7 moderate 1.7 severe(65-75)
2007	WHO Maharashtra	3200	Field survey	12-15 35-44 65-74	WHO	48 moderate 2.9 severe(35-44) 55.2 moderate 4.5 severe(65-74)
2007	WHO Orissa	3200	Field survey	12-15 35-44 65-74	WHO	35.7 moderate 9.7 severe(35-44) 32 moderate 15.6 severe (65-74)
2007	WHO Puducherry	3200	Field survey	12-15 35-44 65-74	WHO	26.3 moderate 4.7 severe (35-44)
2007	WHO Rajasthan	3200	Field survey	12-15 35-44 65-74	WHO	48 moderate 2 severe
2007	WHO Uttar Pradesh	3200	Field survey	12-15 35-44 65-74	WHO	23.5 moderate (35-44) 34.5 moderate 14 severe (65-74)
2008	Parmar et al	168	Dental OPD tobacco chewer	32.7 ± 0.7	NA	54.76
2008	Parmar et al	197	Dental OPD tobacco chewer	30.4 ± 0.8	NA	31
2008	Rooban et al	100	Dental OPD	18-48	NA	76.7
2008	Rooban et al	100	Drug abuser	18-48	NA	23.3

Table 9: Characteristics of the included studies by design and agent vehicle.<sup>14</sup>

Reference	Design/Duration	Intervention	Sites	Outcome
Mahendra	RCT split mouth 3 month	SRP	20	PD, PI, BOP
		SRP + Minocycline Microsphere	20	
Mukhtar	RCT split mouth 3 month	SRP	37	PD, PI, BOP
		SRP + 10% Doxy Gel	51	
Kranty	RCT split mouth 3 month	SRP	20	PD, PI, BOP
		SRP + Tetracycline Hcl fibres	20	
Srinivas	RCT split mouth 3 month	SRP	20	PD, PI, BOP
		SRP + 2.5mg Chlorhexidine gluconate	20	

Table 10: Various regenerative procedures

Guided tissue regeneration- Resorbable and non resorbable membrane
Clot stabilization, wound protection and space closure
Root biomodification
Polypeptide growth factors
Enamel matrix proteins
Graft materials

Conventional treatment modalities for periodontal disease is shown in **Table 7 & 8**

### Nonsurgical therapy;

Antimicrobial Therapy: Administration of systemic antibiotics has been beneficial in periodontal treatment. But they have several problems associated with their use in the treatment of periodontal diseases. Three approaches to antimicrobial therapy have been studied. These include

1. Systemic administration: amoxicillin ,metronidazole combination & ciprofloxacin combination have been found to be effective.<sup>[9]</sup>
2. Topical administration: various mouth rinses & herbal drugs are being studied. Conflict of interest cannot be completely ruled out.
3. Controlled release devices: Resorbable & non resorbable drug delivery system have been studied. Systematic review on the efficacy of local drug delivery system is presented in the [Table 9].

All the above studies reported reductions in gingival inflammation, plaque scores, and bleeding indices in both the control and the experimental groups. It was concluded that use of antimicrobial

sustained-release systems as an adjunct to SRP does not result in significant patient-centered adverse events. Local drug delivery combined with Scaling and root planing appears to provide additional benefits in pocket depth reduction compared with Scaling and root planing alone. Systematic reviews of the data in Indian population is the need of the hour.

#### Lasers:

Extensive studies are being carried out in different research institutes under the watchful eyes of the regulatory bodies like Indian Laser Association and laser institutions. Lasers have been used in Nonsurgical therapy, surgical pocket therapy, Photodynamic therapy, Lasers for implant placement, treatment of periimplantitis, Dentinal hypersensitivity, low level laser therapy, soft tissue procedures like Depigmentation, frenectomy, frenotomy. Systematic reviews and meta analysis of these studies are awaited.<sup>[16]</sup>

#### Regenerative therapy:

Several animal & human studies are being carried out on various regenerative approaches. Sri chitra research institute has been instrumental in bringing out quality indigenous allografts & GTR membranes (Periobone G, Periocol). Extensive studies are being done on various regenerative materials at the institutional level and the research centers. But systematic reviews and meta analysis of studies being conducted in India is needed (Refer Table 10).

#### Periodontal Medicine:

It is a new branch of Periodontology that has developed. It describes the bidirectional interrelationship between the systemic and periodontal diseases. It is a relatively new topic. It has gained momentum very quickly. Several studies are being conducted in various institutions in collaboration with hospitals. This is an encouraging development in periodontal research in India. ICMR has recently initiated research proposal to assess the relationship between periodontitis and preterm labor and low birth weight implants.

The available research data and future data should be subjected to intense scrutiny to separate sham research from original. These studies have to be

subjected to meta-analysis and published in accessible reputed journals. This strong data should form the foundation of public health education. There is no dearth of information among our clinician and researchers. But proper orientation through basic training could do a world of good. Attempts should be made to systematically document, analyze and interpret data. Screening of research for authenticity and appropriate utilization of funds will encourage periodontal research in India.

A collaborative approach between the Public health dentistry and Periodontology is required to improve the quality of dental care. A definite collaborative strategy could bring about radical changes in the public perception and understanding of periodontal research. This approach could help develop effective means of public health education and provision of advanced periodontal care to each and every citizen of our country and not to only the privileged few.

#### Conclusion:

Scientific enquiry is one of the most challenging enterprises of mankind and the support it receives is the measure of strength, vitality and vision of the society. The approach and methods of research have slowly evolved to become more precise and efficient. The tendency is to explore the unknown. Periodontal research has gained a lot of momentum in the present decade. Funding of research has promoted many clinicians and academicians to indulge in active research. Various research centers of global standards are being set up in India. Bioinformatics is available at a mouse click. There is a need to conduct multicentered randomized controlled studies and systematic reviews because we are in an era of evidence based dentistry. There is a need to set up research database which can be easily accessed. Information sharing among various institution and research centers are required. Periodontal research in India has to create its own identity in the global scenario. The ultimate aim of the research should be to benefit the so called 'common man'.

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