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Presurgical Naso-Alveolar Molding (PSNAM) in Cleft Lip/Palate Neonates – A Bibliometric Analysis

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ABSTRACT

Background: PSNAM is a paradigm shift from the conventional approach in the management of cleft lip/palate infants. However, bibliographic analysis of studies which are undertaken to examine research output or dissemination of research on PSNAM are lacking in the arena of Pediatric Dentistry.
Aim: To evaluate all the articles or studies published on the domain 'presurgical naso-alveolar molding in cleft lip/palate infants.'
Design: A detailed search of bibliographic database was carried out for a period of two months from February to March 2023, using medical Mesh keywords. Each published articles were selected, tabulated and evaluated to obtain overall bibliographic details.
Results: A total of 69 articles were obtained following thorough search of the PUBMED database. Maximum publications were found in the journal Plastic Reconstructive Surgery Global Open. Ritschl LM contributed the greatest number of publications followed by Thakur S. India bagged with huge number of publications (26) followed by USA (14). Prospective studies were in maximum number followed by case-control studies.
Conclusion: There is a growing knowledge and application of PSNAM. However, there is insufficient scientific evidence containing randomized prospective studies pertaining to PSNAM. Future research and analysis of its application is highly warranted for its implementation in clinical practice.

Introduction

There is a paradigm shift in the treatment approach for the correction of cleft lip/palate in infants from traditional method to novel concept like presurgical naso-avleolar molding (PSNAM). This technique was introduced by Grayson which consists of active molding of alveolar process as well as the surrounding soft tissues and nasal cartilage. [1] This concept is a non-surgical method of reshaping the cleft lip, palate, alveolus and the nose to minimize the severity of the cleft deformity, before performing definitive surgical therapy in order to enhance the overall surgical outcome. It is associated with advantages like simplicity of the procedure and improving the quality of surgical repair, to obtain tension free muscle in cleft region. The primary goal of this technique in the patients with cleft lip/palate is to restore normal anatomy and function. [2]

Numerous articles including original studies, case reports and even systematic reviews have been published on the domain 'use of PSNAM in cleft lip/palate infants' in the arena of pediatric dentistry. [3-69] Although systematic reviews and randomized clinical trials (RCT) are rated as the most highly cited publications and represent research designs at the top of evidence hierarches, still they account only for 4-6% of research output. As a result, it is difficult for the implementation and dissemination of the research in order to examine ways of moving research evidence, guidelines and best practice recommendations into health practice.[70] A bibliographic review considers all the previous scientific knowledge of a given topic/domain about the research. It is a review article in itself, which can be published as such in scientific journals. Bibliographic reviews are frequently used to describe research activity and characterize research that is undertaken in terms of research output. Moreover, bibliographic studies and reviews have been carried out to describe public health research in broad sector. [71] Unfortunately, literature search did not reveal any such bibliographic reviews which have been undertaken to examine research output or dissemination of research in the field of PSNAM in cleft lip/palate infants. Therefore, the present bibliographic review was carried out to describe the research output pertaining to 'application of PSNAM in cleft lip/palate infants.'

Materials and Methods

The current bibliographic analysis was conducted from the period September to October 2023 using available electronic data base which was retrieved and evaluated retrospectively. The present review used the guidelines of strengthening the Reporting of Observational Studies in Epidemiology (STROBE).

Inclusion criteria

The present bibliographic review included all type of studies, case reports and review articles and even surveys carried out on PSNAM in cleft lip and palate infants.

Exclusion criteria

Studies or case reports showing use of other preorthopedic appliances such as Hotz appliance, feeding appliances were excluded.

Study protocol

For a period of one month, a well-known electronic database like PubMed was searched using the medical Mesh keywords like pre-orthopedic treatment, cleft lip/palate, cleft infant, PSNAM, presurgical naso-alveolar molding, preorthopedic appliance with several combinations. All types of articles published in peer-reviewed journals irrespective of dental specialty were selected. Articles published only in English language were included irrespective of the date. Selected articles were read in detail focusing on title and abstract of the study. When additional information was required or in case of unclear picture of the study, the entire manuscript was downloaded and read. Published each article were tabulated covering the important details like article title, authors name, year of publication, journal name, country where study performed and type of the study. Articles were tabulated in descending

order based on the year of publication starting from new to old articles.

Results

Following electronic search in well-known data base, PUBMED, a total of 451 articles were scrutinized. These articles were thoroughly searched, duplicates and irrelevant publications were eliminated based on the inclusion and exclusion criterion. Finally, only 69 articles were selected for the review and evaluation of which included all case reports, research studies and review articles. Articles with only abstracts including the above domain were not considered. Articles which found from the year 2005 to till date were arranged in descending order from the recent publication to older one (Table 1).

Table 1: *List of selected articles in descending order from new to old showing title of the article, author's name, year of publication, journal name and place of study done.*

Sl. No.	Title of the article	Authors Name	Year of publication	Journal name	Place of study done
1.	Effect of pre-surgical orthopedic treatment on hard and soft tissue morphology in infants with cleft lip and palate.	Ogino S, et al	2023	Diagnostics (Basel, Switzerland)	Japan
2.	The impact of passive alveolar molding vs. nasoalveolar molding on cleft width and other parameters of maxillary growth in unilateral cleft lip palate.	Parhofer R, et al	2023	Clinical Oral Investigations	Germany
3.	Presurgical orthopedic nasoalveolar molding in cleft lip and cleft palate: case report	Shaik N et al	2023	International Journal of Clinical Pediatric Dentistry	India
4.	Parental anxiety/incompliance and patient's complications during COVID-19 pandemic regarding nasoalveolar molding treatment of infants with cleft lip/palate.	Sarmadi S, et al.	2023	The Cleft Palate-Craniofacial Journal	Iran
5.	Morphologic changes following nasoalveolar molding (NAM) in complete unilateral cleft palate: A 3D Analysis of	Harmon et al.	2023	Plastic Reconstructive Surgery Global Open.	Chicago

	3D Stereophotogrammetry.				
6.	Surgical assistance for favourable outcome achieved through presurgical nasoalveolar molding using innovative impression technique: A case report.	Rathee M et al.	2023	International Journal of Clinical Pediatric Dentistry	India
7.	Perception and attitude of parents of children with orofacial clefts regarding the use of presurgical orthopedics and feeding obturators.	Alqadi et al.	2023	Cureus	SAU
8.	Changes in nasal symmetry after presurgical nasoalveolar molding in infants treated with complete unilateral cleft lip and palate: A follow-up study	Thakur S, et al	2022	Dental Research Journal (Isfahan)	India
9.	Clinical outcomes of bilateral cleft lip and palate repair with nasoalveolar molding from birth to facial maturity.	Rochlin et al.	2022	Plastic Reconstructive Surgery Global Open	New York
10.	A point of care digital workflow for 3D printed passive presurgical orthopedic plates in cleft care.	Zarean P, et al	2022	Children (Basel)	Switzerland
11.	Modified presurgical nasoalveolar molding for patients with neonatal complete bilateral cleft lip and palate having a severely malpositioned premaxilla.	Hao J, et al.	2022	American Journal of Translational Research	China
12.	Short-term surgical outcomes in patients with unilateral complete cleft lip and palate after	Yin J, et al	2022	Frontiers in Pediatrics	China

	presurgical nasoalveolar molding therapy: A three-dimensional anthropometric study.				
13.	The burden of care in nasoalveolar molding treatment in cleft patients.	Magyar D, et al.	2022	Indian Journal of Plastic Surgery	Hungary
14.	Recent advances in nasoalveolar molding therapy using 3D Technology.	Ahsanuddin S, et al	2022	Craniomaxillofacial Trauma and Reconstruction	USA
15.	Naso-alveolar molding for newborn cleft lip and palate.	Breh et al	2022	Bioinformation	India
16.	NAM – help or burden? Intercultural evaluation of parental stress caused by nasoalveolar molding: a retrospective multi-center study.	Roth M, et al	2021	Clinical Oral Investigations	Germany
17.	Comparative evaluation of nasal and alveolar changes in complete unilateral cleft lip and palate patients using intraoral and extraoral nasoalveolar molding techniques: randomized controlled trial.	Kalaskar R, et al	2021	Journal of Korean Association of Oral and Maxillofacial Surgery	India
18.	Comparative clinical evaluation of modified and conventional Grayson's presurgical nasoalveolar molding technique in infants with complete unilateral cleft lip and palate.	Thakur S, et al	2021	Dental Research Journal (Isfahan)	India
19.	Mother's knowledge and experience concerning presurgical orthopedic management for infants with cleft lip and palate.	Abid M, et al	2021	Journal of Orthodontic Science	Iraq
20.	A modified presurgical alveolar molding technique for treatment	Gonca M, Ozel MB.	2021	Korean Journal of Orthodontics	Turkey

	of cleft in Down syndrome				
21.	Dynamic changes in nasal symmetry after presurgical nasoalveolar molding in infants with complete unilateral cleft lip and palate.	Thakur S, et al	2020	African Journal of Paediatric Surgery	India
22.	Surgical nasoalveoalr molding:A rational treatment for bilateral cleft lip nose and systematic review.	Rossell-Perry et al.	2020	Plastic and Reconstructive Surgery. Global open	Peru
23.	NYU Nasoalveolar molding protocol: From birth to adulthood.	Shen et al.	2020	Plastic and Reconstructive Surgery. Global open	New York
24.	Three-Dimensional morphological changes of the true cleft under passive presurgical orthopaedics in unilateral cleft lip and palate: A Retrospective Cohort study.	Nalabothu P, et al	2020	Journal of Clinical Medicine	Switzerland
25.	Comparative photographic, retrospective analysis of nonsyndromic cleft noses treated with or without NAM.	Wolff KD, et al	2020	Plastic Reconstructive Surgery Globe Open.	
26.	Teleconsultation-mediated nasoalveolar molding therapy for babies with cleft lip/palate during the COVID-19 outbreak: Implementing change at pandemic speed.	Denadai and Lo	2020	Journal of Plastic and Reconstructive Surgery.	Brazil
27.	Time-driven, activity-based costing of presurgical infant orthopedics: A critical component of establishing value of Latham Appliance and nasoalveolar molding.	Ganske et al.	2020	Plastic and Reconstructive Surgery Global Open.	Boston

28.	Better late than never!	Jain R	2020	Journal of Indian Prosthodontic Society	India
29.	Three-dimensional evaluation of alveolar changes induced by nasoalveolar molding in infants with unilateral cleft lip and palate: A case-control study.	Burgaz MA, et al	2019	Korean Journal of Orthodontics	Turkey
30.	Three-Dimensional assessment of morphological changes following nasoalveolar molding therapy in cleft lip and palate patients: A case report.	Staderini E, et al	2019	Dentistry Journal	Italy
31.	A comparative evaluation of efficacy and efficiency of Grayson's presurgical nasoalveolar molding technique in patients with complete unilateral cleft lip and palate with those treated with Figuero's modified technique	Singh A, et al	2018	Contemporary Clinical Dentistry	India
32.	Presurgical nasoalveolar moulding in clp patients.	Datta A	2018	Journal of Indian Prosthodontic Society	India
33.	Facilitating CAD/CAM nasoalveolar molding therapy with a novel click-in-system for nasal stents ensuring a quick and user-friendly chairside nasal stent exchange.	Grill FD, et al	2018	Scientific Reports	Germany
34.	Active presurgical infant orthopedics for unilateral cleft lip and palate: Inter-center outcome comparison of Latham, Modified McNeil and Nasoalveolar molding.	Kornbluth M, et al.	2018	The Cleft Palate-Craniofacial Journal	North America

35.	Management of cleft lip and cleft palate by presurgical nasoalveolar molding.	Rajguru VL	2018	Journal of Indian Prosthodontic Society	India
36.	Effectiveness of presurgical nasoalveolar molding therapy on unilateral cleft lip nasal deformity.	Kinouchi N, et al.	2018	Saudi Medical Journal	Japan
37.	Achievement I nasal symmetry after cheiloplasty in unilateral cleft lip and palate infants treated with presurgical nasoalveolar molding.	Thakur S et al.	2018	Contemporary Clinical Dentistry	India
38.	The effects of presurgical nasoalveolar molding on the midface symmetry of children with unilateral cleft lip and palate: A long-term follow-up study.	AlHayyan WA, et al	2018	Plastic and Reconstructive Surgery. Global Open.	Saudi Arabia
39.	Stress distribution patterns within viscero and neurocranium during nasoalveolar molding: a Finite Element Analysis.	Ritschl et al.	2018	Plastic Reconstructive Surgery, Global Open.	Germany
40.	Presurgical nasoalveolar molding of bilateral cleft lip and palate infants: An Orthodontist's point of view	Altug AT.	2018	Turkish Journal of Orthodontics	Turkey
41.	Presurgical cleft lip and palate orthopedics: an overview	Alzain I et al.	2017	Clinical, Cosmetic and Investigational Dentistry	Jeddah, Saudi Arabia
42.	The role of nasoalveolar molding: A 3D prospective analysis.	Chou PY et al.	2017	Scientific Reports	Taiwan
43.	Treatment outcomes of pre-surgical infant orthopedics in patients with non-syndromic cleft lip and/or palate: A systematic review and meta-analysis of	Hosseini et al	2017	PLoS One	UAE

	randomized controlled trials.				
44.	Correlation between nasoalveolar molding and surgical, aesthetic, functional and socioeconomic outcomes following primary repair surgery: a systematic review.	Maillard et al.	2017	Journal of Oral and Maxillofacial Research	New York
45.	Surgeon's and caregiver's appraisal of primary cleft lip treatment with and without nasoalveolar molding: A prospective multicenter pilot study.	Broder et al.	2016	Plastic and Reconstructive Surgery	New York
46.	Presurgical nasoalveolar moulding in unilateral cleft lip and palate.	Zuhaib M et al.	2016	Indian Journal of Plastic Surgery	India
47.	Presurgical nasoalveolar molding: A boon to facilitate the surgical repair in infants with cleft lip and palate.	Attiguppe PR, et al.	2016	Contemporary Clinical Dentistry	India
48.	A modified presurgical orthopedic (nasoalveolar molding) device in the treatment of unilateral cleft lip and palate.	Subramanian et al.	2016	European Journal of Dentistry	India
49.	Presurgical nasoalveolar moulding: A boon in the management of cleft lip and palate.	Chaudhary DC, et al.	2016	Medical Journal of Armed Forces India	India
50.	Complex correction of complete cleft lip with severe prominent premaxilla using lip adhesion and nasoalveolar molding device.	Seo BN et al.	2015	Archives of Craniofacial Surgery	Korea
51.	Surgeon's assessment of presurgical outcome in patients treated with and without nasoalveolar molding.	Rubin MS, et al.	2015	The Journal of Craniofacial Surgery	New York

52.	Nasoalveolar molding in cleft care – experience in 40 patients from a single centre in Germany	Rau A, et al	2015	PLoS One	Germany
53.	Coping with cleft: A conceptual framework of caregiver responses of nasoalveolar molding.	Sischo L, et al.	2015	Cleft Palate Craiofacial Journal	New York
54.	Presurgical nasoalveolar molding in unilateral cleft lip and palate.	Hegde et al.	2015	Contemporary Clinical Dentistry	India
55.	Nasoalveolar molding in a case of incomplete cleft lip: is it worth doing?	Esenlik E & Aydin MA.	2015	Annals of Maxillofacial Surgery	Turkey
56.	Presurgical nasoalveolar remodeling - An experience in the journey of cleft lip and palate.	Mandwe RS, et al.	2014	Clinical, Cosmetic and Investigational Dentistry.	India
57.	Current status of presurgical infant orthopaediac treatment for cleft lip and palate patients: A critical review.	Niranjane PP, et al	2014	Indian Journal of Plastic Surgery	India
58.	Presurgical nasal moulding in a neonate with cleft lip.	Deshpande et al.	2014	BMJ Case Reports	India
59.	Nasoalveolar moulding for children with unilateral cleft lip and palate.	Chammanam SG, et al	2014	Journal of Maxillofacical and Oral Surgery	India
60.	Presurgical nasoalveolar molding: changing paradigms in early cleft lip and palate rehabilitation.	Murthy PS et al	2013	Journal of International Oral Health	India
61.	Naso alveolar molding in early management of cleft lip and palate	Jayashree M, Paul S.	2013	Journal of Indian Prosthodontic Society	India
62.	Supporting the drive to thrive in cleft lip and palate infant – a case report.	Thabitha Rani et al	2013	Journal of Clinical Diagnostic Research	India

63.	Nasoalveolar molding: Prevalence of cleft centers offering NAM and who seeks it.	Sischo L, et al.	2012	The Cleft Palate-Craniofacial Journal.	New York
64.	Nasal outcomes of presurgical nasal molding in complete unilateral cleft lip and palate.	Williams EM, et al.	2012	International Journal of Dentistry	USA
65.	Long-term treatment outcome of presurgical nasoalveolar molding in patients with unilateral cleft lip and palate.	Clark SL, et al	2011	The Journal of Craniofacial Surgery.	New York
66.	Pre-surgical management of unilateral cleft lip and palate in a neonate: A clinical report	Banerjee S, et al.	2011	Journal of Indian Prosthodontic Society	India
67.	Presurgical nasoalveolar molding for correction of cleft lip nasal deformity: Experience from Northern India.	Mishra B et al	2010	Eplasty	India
68.	Presurgical nasoalveolar moulding treatment in cleft lip and palate patients.	Grayson BH & Shetye PR.	2009	Indian Journal of Plastic Surgery.	New York
69.	Nasoalveolar molding for infants born with clefts of the lip, alveolus and palate.	Grayson BH & Maull D.	2005	Seminars in Plastic Surgery	New York

Descriptive analysis of publications

Publication year analysis

The first article about description of this new concept can be found in 2005 by Grayson and Maull. From 2005 onwards no publications were seen in the literature. Later again in 2009, Grayson and Shetye published a case report on this treatment modality. In 2010, from India, Mishra et al performed fist prospective clinical trial and published an article. From 2011 to 2023, numerous articles have been published in English language. Maximum publications can be seen in the year 2018 (n=10) followed by 2022 (8) and 2023 (n=7) (Table 2).

Table 2: *Publication Year analysis*

Sl. No.	Year of the Publication	Number of publications
1.	2005	1
2.	2009	1
3.	2010	1
4.	2011	2
5.	2012	2
6.	2013	3
7.	2014	4
8.	2015	6
9.	2016	5
10.	2017	4
11.	2018	10
12.	2019	2
13.	2020	7
14.	2021	4
15.	2022	8
16.	2023	7

Author analysis

Analysis of authors who contributed to their publications in this domain consisted of 814 researchers. Published articles consisted authors in number ranging from a single author to maximum of 12 authors although there is a strict author guideline for the contribution to an original research study is about 6 authors and for a case report or review article is about 4 authors. This shows the quality of journals which incorporated more than six authors although they are known or listed for quality indexed journal in top most indexing database.

Although maximum contribution of publications is from India (26), the credit of maximum number of publications is contributed by the author Ritschl LM (n=6) followed by Thakur S from India (n=5) and Broder HL (n=4). Authors like Thakur NS, Wolff KD, Singh A, Rani A, Diwana VK, Grill FD, Sischo L, Loeffelbein DJ and Grayson BH have contributed three publications each. Six articles were authored by only two authors and only four publications were authored by a single author (Table 3).

Table 3: *Author's analysis*

Authors/researchers	Contribution to number of publications
Ritschl LM	6
Thakur S	5
Broder HL,	4
Jishad C	2
Singh A	3
Wolff KD	3
Rani A	3
Diwana VK	3

Grill FD,	3
Sischo L,	3
Thakur NS	3
Loeffelbein DJ.	2
Grayson BH	3
Rau A	3

Journal analysis

Among 69 articles, maximum publications were found in Plastic and Reconstructive Surgery Global Open journal (n=8), followed by Journal of Indian Prosthodontic Society (n=5). From other journals like Contemporary Clinical Dentistry, Indian Journal of Plastic Surgery and the Cleft Palate Craniofacial Journal, equal number of publications were retrieved (n=4). More than one articles were found in journals like Dental Research Journal (Isfahan), Clinical, Cosmetic and Investigational Dentistry, PLoS One, International Journal of Clinical Pediatric Dentistry, Journal of Craniofacial Surgery, Clinical Cosmetic Investigation Dentistry, Korean Journal of Orthodontics, Clinical Oral Investigation and Science Report journal (n=2) (Table 4).

Table 4: *Journal analysis*

Sl. No.	Journal Name	Total number of publications
1.	Plastic and Reconstructive Surgery Global Open	8
2.	Journal of Indian Prosthodontic Society	5
3.	Contemporary Clinical Dentistry	4
4.	Clinical, Cosmetic and Investigational Dentistry	2
5.	The Cleft Palate-Craniofacial Journal	4
6.	Indian Journal of Plastic Surgery	4
7.	Dental Research Journal (Isfahan)	2
8.	PLoS One	2
9.	International Journal of Clinical Pediatric Dentistry	2
10.	Journal of Craniofacial Surgery	2
11.	Clinical Cosmetic Investigation Dentistry	2
12.	Korean Journal of Orthodontics	2
13.	Clinical Oral Investigation	2
14.	Science Report	2

Country analysis

Various nations across the globe have contributed publications about this domain. Among these, India is bagged with maximum publications (n=26) followed by USA (n=14), Germany (n=5) and Turkey (n=4). Other countries like Japan, Switzerland and China have contributed more than one publication (n=2). A single publication is given by countries like Iraq, Iran, Taiwan, Hungary, Peru, Brazil, Italy, Korea, SAU and Saudi Arabia (Table 5) (Figure 1).

Table 5: *Country analysis*

Sl. No.	Country Name	Number of publications
1.	India	26
2.	USA	14
3.	Germany	5
4.	Turkey	4
5.	China	2
6.	Japan	2
7.	Switzerland	2
8.	Other countries	14

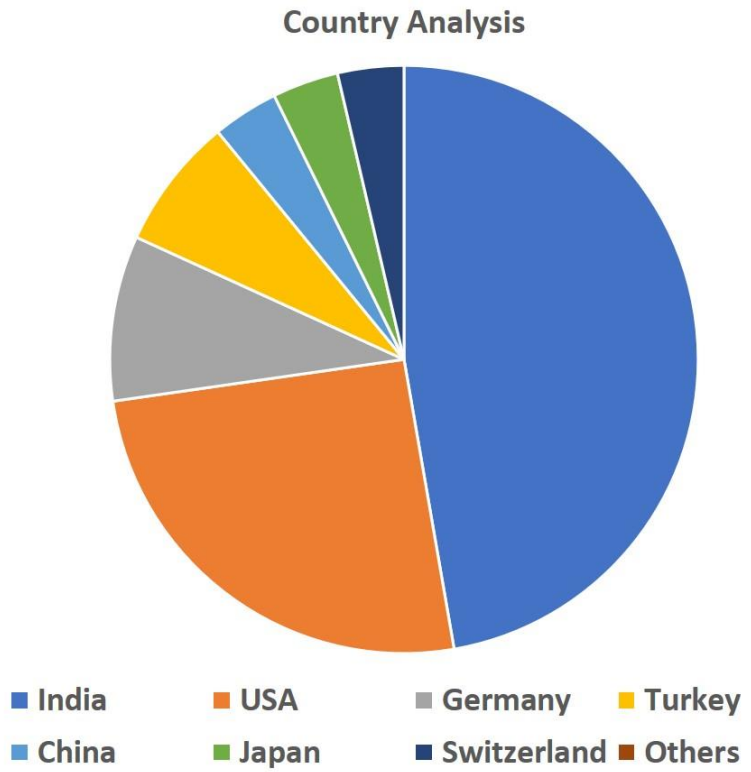

Figure 1: *Pie-Diagram showing Publication contribution by different countries*

Publication type analysis

Evaluation of publication type revealed 15 prospective studies, 10 case control studies, 7 retrospective studies, one randomized clinical trial, 15 case reports, 2 case series, 6 review articles, 7 surveys. 4 systematic reviews were found about this domain. In addition to these, one letter to the editor and a single multi-centric study was found (Figure 2).

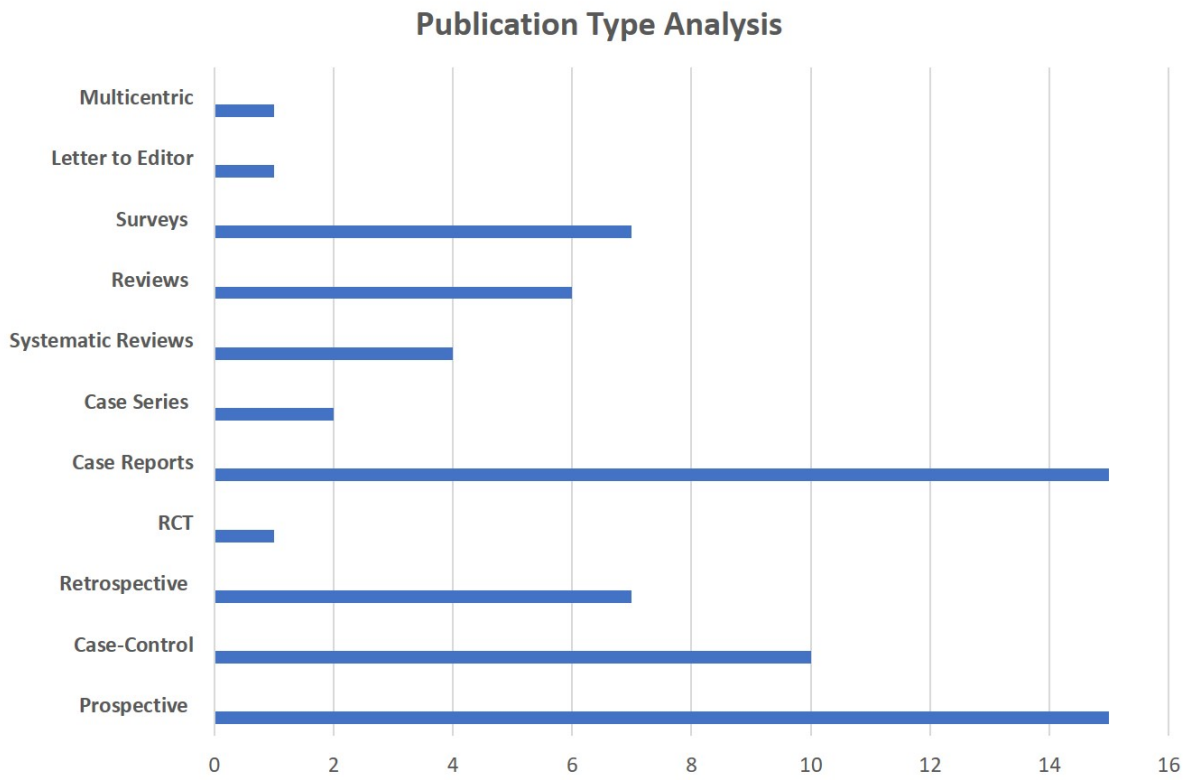

Figure 2: *Analysis of different types of Publications on PSNAM*

Discussion

In this bibliographic review, all journals with keywords of PSNAM, NAM, cleft lip or palate, pre-orthopedic devices and which are published in English language in well-known database like PUBMED were searched from inception till august 2023. All publications including original studies, review articles and even case reports were considered for evaluation. A total of 451 articles were found in database among which only 69 articles were selected based on the inclusion criteria. The selected 69 articles were classified as original studies, review articles and case reports and systematic reviews. In terms of period of publication, articles can be seen from 2005 to 2023. Although this concept has been suggested long back in the year 2005, till 2011, except one case report and a review article, no original studies publications can be found in the literature. Maximum publications were found in the year 2018 (n=10). In the year 2019 a tremendous decline in publication/research (n=2) can be found which may be due to COVID attack. When type of publications was analysed, it was found that 15 were case reports and two were case series, six were review articles, four of systematic review seven were of questionnaire surveys and remaining were original studies including prospective, case-control, RCT and retrospective studies. Though these original studies showed high level of evidence and impact of the article, however its relevance to further research is highly warranted. One landmark publication was noticed in this analysis which includes a retrospective multi-center study evaluating the intercultural parental stress caused by PSNAM therapy conducted by Roth and his co-researchers in 2021.

Analysis of publication contribution by different countries towards PSNAM revealed majority of articles by institutions and authors from India (n=26). The reason behind this fact can be attributed to the increased prevalence of

consanguineous marriages and in turn occurrence of high number of cleft lip and palate births, vast population, focus on health sciences and research, and promotion of health research through the availability of free treatment organizations like 'Smile train' as well as government funding. In addition to these, recently India is tremendously improving by leaps and bounds in terms of development and medical research. The second highest number of publications were contributed from USA (n=14) followed by Germany (n=5) and Turkey (n=4). Japan, China and Switzerland contributed two publications each pertaining to PSNAM.

Author's contribution towards PSNAM publications showed maximum publication of six by Ritschl from Germany. However, among these six publications, in only one publication he is authored as first author. In contrast to this, the second maximum publications were evidenced from India by author Thakur S bagged with 5 publications. Among these five publications, he is listed as first author in four publications. Author Broder HL from Germany contributed four publications. Articles with single author are contributed by four people like Jain, Datta, and Rajguru all from India37, and Altug42 from Turkey. Publications authored by only two authors were found in six articles. They are Gonca and Ozel from Turkey, Denadai and Lo from Brazil, Jayashree and Paul from India, Grayson wit Shetye from New York, Esenlik and Aydin from Turkey and Grayson and Maull from New York. Six publications were authored by three authors. Great number of publications (n=8) were found in the journal Plastic and Reconstructive Surgery Global Open which has impact factor of 3.6 followed by Journal of Indian Prosthodontic Society (n=5) with an impact factor 1.2. Journals like Contemporary Clinical Dentistry, The Cleft Palate-Craniofacial Journal and Indian Journal of Plastic Surgery have contributed four publications each.

From the current bibliographic analysis regarding application of PSNAM in cleft lip/palate infants, few limitations were observed. Although author have used thorough and systematic method for identification, selection and analysis of all articles published so far on PSNAM in cleft lip/palate domain, a single data base search (only PUBMED) was used in this evaluation. Therefore, articles or publications on the same domain with different titles or with different combination of keywords will be obtained from search of other databases like Scopus, Web of Science, Google Scholar or Embase. Another limitation experienced was author details were missing in some publications and it was difficult to trace the primary author who contributed to the particular study in case of multiple authors. Therefore, author with corresponding address or corresponding author was considered as primary author. The present review definitely marks an important source of information for other researchers to conduct such more reviews.

Finally, authors would like to conclude that the present bibliographic analysis on the domain 'application of PSNAM in cleft lip/palate infants' identified numerous different publications. There is a growing knowledge and application of PSNAM in cleft lip/palate infants. However, there is insufficient scientific evidence containing randomized prospective studies pertaining to PSNAM. Future research and analysis of its application is highly warranted for its implementation in clinical practice.

Why this paper is important to paediatric dentists

- Pediatric dentist should focus on this treatment modality by implementing this novel approach in the treatment of cleft lip/palate infants.
- The interdepartmental collaboration including multiple specialities should happen to enhance research output.
- The present analysis provides evidence and research output across the globe on existing literature of PSNAM in cleft lip/palate infants.

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