

Use of silicone finger prostheses in amputee patients: An integrative review

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Abstract

This study aimed to perform an integrative review of the literature on the use of silicone finger prostheses in amputee patients. Searches were performed in the PubMed, EMBASE, Web of Science, Scielo, and Cochrane Library databases until July 2021. Descriptors used in this article were: Silicone, finger, rehabilitation, and prosthesis. Clinical research and clinical reports on silicone finger prostheses, available in full and in English were included. Initially, 152 articles were identified. After establishing the inclusion/exclusion criteria, 23 studies were identified and constituted the final sample. Regarding the publication date of the included studies, 17.2% of them were published between 2012 and 2016. Most of the rehabilitations occurred in India (69.9%; $n = 16$), and the mean age of patients who used prostheses was 38.1 years. The level of scientific evidence of the included studies was IV and VI. Therefore, patients rehabilitated with silicone finger prostheses highlighted significant improvements in functional range of motion, restoration of self-esteem, advantages in psychological therapy, more pleasant social interaction, and changes in their quality of life.

Keywords: Finger, prosthesis, rehabilitation, Silicone

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INTRODUCTION

Human hands play important roles in functional movements performed by human beings, as well as, it is fundamental to interpersonal relationships within society. According to Atroshi and Rosberg,^[1] finger amputation is the most incident, corresponding to 1.9 in 100,000 individuals.

However, in cases of crushing and severe lacerations in which microsurgical reconstruction by reimplantation

is not advisable, finger rehabilitation with silicone prosthesis becomes a viable option to regain hope and make these patients feel comfortable in their social relationships, improvement in the psychological state with the development of personality, increased confidence and acceptance in society, besides recovering the esthetic and functional aspects of the lost limb.^[2-4]

The finger prostheses can be constructed by several techniques (suspension with medical glue, vacuum,

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osseointegrated implants, and mechanical attachment on fingers next to the stump). Considering aesthetics of finger prostheses, they must be made with good-quality silicones, that allow optimal reproduction of skin tone by means of extrinsic pigmentation, drawings of wrinkles, striations, and the characterization of fingernails in acrylic resin.^[5-8]

Thus, for the rehabilitation to become usual, it is recommended to use the silicone technique, because it has higher esthetics, function and presents a low financial cost for the patient.^[9] With that in mind, this paper sought to conduct the first integrative review of the literature regarding the use of silicone finger prostheses in amputee patients.

MATERIAL AND METHODS

Research strategy and information sources

This research is an integrative review produced by following the methodological rigor described by Hermont *et al.*,^[10] which contribute to new investigations and clinical resolutions by professionals in the dentistry fields. The studies were analyzed critically according to: (i) Selection of the theme and hypothesis, (ii) Establishment of the inclusion/exclusion criteria of the studies; (iii) Information to be extracted from the articles; (iv) Evaluation of the quality of the studies; (v) Critical analysis of the results and their contributions; (vi) Capacity to produce scientific knowledge.

Guiding question

The central question was framed to address a study question based on population, interest, context:^[11] “What are the studies that have evaluated the use of silicone finger prostheses in amputee patients?”

- *Population* = Patient with the amputated finger
- *Interest* = Impact of silicone prosthesis
- *Context* = Rehabilitation of patients with finger prostheses.

Strategic search

The search strategy consisted of a bibliographic survey in PubMed, EMBASE (Excerpta Medica Database), Web of Science, Scielo (Scientific Electronic Library Online), and Cochrane Library databases, until July 2021. English terms used were “silicone” and “finger” and “rehabilitation” and “prosthesis.” The Boolean algorithm “AND” connected the search terms.

Data collection

Bibliographic searches were exported to the software EndNote Program™ version X7 (Thomson Reuters, New York, NY, USA) and the duplicates were removed.

Review articles, clinical cases of limb rehabilitation, panels, short communications, technical notes, book chapter, *in vitro* studies, conference abstract publications, and letters to the editor were excluded. Clinical research and clinical articles related to silicone finger prostheses, articles in the English language and available in full were included. The papers were critically appraised in five important methodological steps:

- a. Exclusion of studies by title and abstract
- b. Systematic and critical analysis of the information contained in the clinical case reports
- c. Selection and extraction of data by two independent and calibrated researchers (coauthors F. I. D. C. and V. A. N.). In case of conflicting data and information, a third evaluator (coauthor M. F. H.) was requested
- d. Critical and systematic investigation of all references, searching for articles without keywords
- e. Data were classified according to the tool developed by Melnyk and Fineout-Overholt that categorizes the levels of evidence as follows:^[11]
 - I. Meta-analysis of controlled studies
 - II. Experimental design studies
 - III. Quasi-experimental design studies
 - IV. Experimental studies with nonexperimental design such as descriptive correlational and qualitative research or case studies
 - V. Case reports or data obtained systematically of verifiable quality or program evaluation data
 - VI. Qualitative studies
 - VII. Opinion of reputable authorities based on clinical competence or opinion of expert committees.

After careful analysis of the evidence levels, data were structured and sorted according to clinical findings on the rehabilitation of patients with silicone finger prostheses as shown in Table 1. To highlight the selected articles, they were grouped into themes for discussion.

Quality appraisal

Two evaluators (N coauthors F. I. D. C. and V. A. N.) assessed the quality of the studies, separately. Any disagreement was resolved through discussion with a third reviewer (coauthor M. F. H.). The Joanna Briggs Institute checklist was used for qualitative studies.^[12] Although there is no standard tool for assessing the quality of qualitative studies, this checklist proved to be effective for this type of analysis as described before.^[13,14] Studies were categorized according to the percentage of positive responses. The risk of bias was classified as high (when the study obtained 49% of “yes” responses), moderate (50% to 69% of “yes” responses), or low (70% of “yes” responses). The Effective Public Health Practice Project: Quality Assessment Tool

Table 1: Studies included in the integrative review about the rehabilitation of patients using silicone finger prostheses

Author/year	Country	Sample	Age	Title of study	Objective	Clinical outcome	Study design/database
Aduayom-Ahego, 2020	Ghana	Male: 0 Female: 1	25	Prosthetic rehabilitation of multiple-digits amputations using silicone material in sub-Saharan African country Ghana	To describe the rehabilitation of a patient with multiple finger amputations in Ghana, West Africa	Rehabilitation of multiple-digit loss using real silicone cosmetic finger prostheses. Regaining hope and be social comfortable	Level VI PubMed, EMBASE, Web of Science
Aggarwal <i>et al.</i> , 2016	India	Male: 0 Female: 1	21	Interdisciplinary approach for somatoprosthetic rehabilitation of a patient with clino-syndactyly and unusual dermatoglyphics	To report a interdisciplinary approach for somatoprosthetic rehabilitation of a patient with clino-syndactyly and unusual dermatoglyphics	The duplication of unusual dermatoglyphics made the prosthesis more realistic	Level VI PubMed
Ahmad <i>et al.</i> , 2013	India	Male: 0 Female: 1	21	Comprehensive Rehabilitation of Partially Amputated Index Finger with Silicone Prosthesis: A Case Report with 3 years of Follow Up	To describe a technique which eliminates the need for adhesive materials and utilizes copper wire to fabricate a finger ring as a primary means of retention	Restoration of both form and function. The custommade prosthesis is esthetically acceptable, partially restores some degree of function, and is comfortable for patient resulting in psychological improvement with personality development. The patient was well satisfied with the prosthesis and was using it regularly	Level VI PubMed
Asnani <i>et al.</i> , 2015	India	Male: 1 Female: 0	23	Rehabilitation of amputated thumb with a silicone prosthesis	To describe a simple technique for fabricating silicon finger prosthesis for a patient after an accident in childhood	Silicon finger prostheses is comfortable improves function, has psychological advantage, and desirable cosmetic outcome	Level VI PubMed
Aydin <i>et al.</i> , 2007	Turkey	Male: 1 Female: 0	20	Implant-retained digital prostheses with custom-designed attachments: A clinical report	To describe the use of osseointegrated implants with custom- designed attachments for retention of digital prostheses in a patient with traumatic amputation of 4 digits	Use of osseointegrated digital implants involves the same principles as facial implants. The patient must have a movable metacarpophalangeal joint to be able to achieve adequate function of the prostheses	Level VI PubMed, EMBASE
Baheti <i>et al.</i> , 2014	India	Male: 0 Female: 1	51	Finger prosthesis- an attempt to simulate divine creations: A clinical case	To present the prosthetic rehabilitation of amputated fingers with a custom-made prosthesis fabricated using silicone elastomers and retained with the help of magnet	The custom-made finger prosthesis was aesthetically acceptable, partially restored some degree of functionality. Comfortable for patient's use resulting in psychological improvement and her personal development	Level VI EMBASE
Gaikwad <i>et al.</i> , 2019	India	Male: 1 Female: 0	54	Recreating the first digit with silicone prosthesis	To describe a straightforward technique for fabricating silicone thumb prosthesis for a patient with amputated thumb	Silicone thumb prosthesis for amputated thumb is a good alternative option for microsurgery which improves the normal functioning and gives life-like appearance to an individual	Level VI PubMed
Goiato <i>et al.</i> , 2009	Brazil	Male: 1 Female: 0	68	Implant-retained thumb prosthesis with anti-rotational attachment for a geriatric patient	To present the use of a dental implant with an anti-rotational attachment for the retention of a thumb prosthesis	The implant-retained digital prosthesis presents some motor limitations, but its use allows the patient to return to normal life and achieve social interaction	Level VI PubMed, EMBASE
Goiato <i>et al.</i> , 2012	Brazil	Male: 1 Female: 0	56	Implant-retained finger prosthesis with modified retention system	To describe a simple technique for fabrication of implant-retained finger prosthesis with a modified base of the retention system	The prosthesis was made with silicone, and after osseointegration, it was installed without complications, leading to a patient satisfied with the end result and encouraged to return to social life.	Level VI PubMed, EMBASE, Web of Science

Contd...

Table 1: Contd...

Author/year	Country	Sample	Age	Title of study	Objective	Clinical outcome	Study design/ database
Goyal, Goel, 2014	India	Male: 1 Female: 0	28	Prosthetic rehabilitation of a patient with finger amputation using silicone material	To describe the rehabilitation of a man whose ring finger was amputated following an RTA	Final prosthesis was found with adequate retention. The patient was satisfied with the aesthetic of the prosthesis	Level VI PubMed, EMBASE, Web of Science
Jacob <i>et al.</i> , 2012	India	Male: 0 Female: 1	22	Silicone Finger Prosthesis. A Clinical Report	To present a case of rehabilitation of a finger defect with a silicone prosthesis and describe a method of retention for the same	There are many methods of retention such as implant and adhesives. An alternate method using both suction and vacuum was attempted and found to be quite successful	Level VI PubMed, EMBASE
Jain <i>et al.</i> , 2016	India	Male: 1 Female: 0	25	Three-part mold technique for fabrication of hollow thumb prosthesis: A case report	To describe a technique which helps in the fabrication of glove-type hollow thumb prosthesis using three-part mould technique	The thumb prosthesis helps in reduction in weight, easy packing of silicone material into the mold, and easy color customization at the knuckles area of the dorsal and ventral aspect of the prosthesis	Level VI PubMed
Kumar <i>et al.</i> , 2012	India	Male: 1 Female: 0	42	Finger Prosthesis with an Alternative Approach	To present a case of finger prosthesis fabricated by a modified impression technique	The patient was highly appreciative of the social acceptance after he started wearing the finger prosthesis	Level VI PubMed
Kuret <i>et al.</i> , 2018	Slovenia	Male: 20 Female: 22	17- 70	Adjustment to finger amputation and silicone finger prosthesis use	To evaluate the adjustment to amputation and prosthesis use in patients after finger amputation	Silicone prostheses for finger amputation of the upper limb play an important role in the process of adaptation to amputation. They offer aesthetically satisfying results and alleviate social interactions, which influences overall quality of life	Level IV PubMed, EMBASE, Web of Science
Kuret <i>et al.</i> , 2018	Slovenia	Male: 20 Female: 22	17- 70	Impact of silicone prosthesis on hand function, grip power and grip-force tracking ability after finger amputation	To describe the impact of silicone finger prostheses on hand function and gripping ability	A minimum improvement of hand function can be expected at best with silicone prostheses for finger amputation accompanied by a slight decrease in tip grip power	Level IV PubMed, EMBASE, Web of Science
Mehta <i>et al.</i> , 2018	India	Male: 0 Female: 1	12	Prosthetic rehabilitation of a partially amputated finger using a customized ring-wire substructure	To describe a cost-effective and simple approach of rehabilitation of a partially amputated finger with bulbous distal anatomy using a custom-made ring-wire substructure and maxillofacial silicone, thereby striking a balance between adequate retention and optimal esthetics	The finger prosthesis with custom-made ring-wire substructure was functionally adequate and esthetically acceptable by the patient. Even though there was a display of the wire on the lateral aspect of the index finger, the patient was highly satisfied with the appearance of the prosthesis	Level VI PubMed, Web of Science
Mehta <i>et al.</i> , 2019	India	Male: 1 Female: 0	12	Rehabilitation of missing digit using customized attachment supported prosthesis	To describe a novel method to achieve a secure prosthetic fit in patients where the residual finger stump is completely absent	Advantages of this customized attachment are as follows: cost-effective, easily customizable, improves functional ability, and provides a psychological advantage for patients who have lost a finger but do not have a residual stump	Level VI PubMed, Web of Science

Contd...

Table 1: Contd...

Author/year	Country	Sample	Age	Title of study	Objective	Clinical outcome	Study design/ database
O'farrell <i>et al.</i> , 1996	USA	Male: 15 Female: 18	24-84	Long-term follow-up of 50 duke silicone prosthetic fingers	To assess patient satisfaction with, and usage of, custom-made digital prostheses in the longer term	The success of prosthetic fingers depends largely on excellent primary surgery when fashioning the amputation stump, realistic goals of the surgeon and patient, careful patient selection, high manufacturing standards, and a follow-up facility which provides rapid efficient service for the patient's lifetime	Level VI PubMed
Raghu <i>et al.</i> , 2013	India	Male: 1 Female: 0	65	Esthetic finger prosthesis with silicone biomaterial	To describe a conventional method of finger prosthesis fabrication, with a new approach or modification of amputated fingers for better retention and comfort	The success of prosthesis depends on precision in planning, making the impression, carving the model and choosing the material that best suits the circumstances. Acceptance of prosthesis depends heavily on its ability to effectively represent the appearance and comfort	Level VI PubMed
Saxena <i>et al.</i> , 2014	India	Male: 1 Female: 0	55	Rehabilitation of Digital Defect with Silicone Finger Prosthesis: A Case Report	To describe a technique for the fabrication of made finger prosthesis with a silicone elastomer	With the availability of advanced technology and materials, it is possible to make a prosthesis that is made life-like. Well-fabricated finger prosthesis with good aesthetics greatly influences the psychology of the patient	Level VI PubMed, EMBASE
Thomas <i>et al.</i> , 2017	India	Male: 1 Female: 0	22	Osseo integrated finger prosthesis with a custom abutment	To report a case of Osseointegrated finger prosthesis with a custom abutment	Rehabilitation of defective finger by means of conventional and implant-retained artificial prosthesis improves patient's confidence level to a great extent by improving the esthetic outcome However, an implant-retained prosthesis showed more retentive and functional outcome in addition to esthetics Whenever the residual bone quality and quantity is satisfactory its preferred to proceed with an osseointegrated prosthesis	Level VI PubMed
Tripathi <i>et al.</i> , 2012	India	Male: 1 Female: 0	28	A modified approach of impression technique for fabrication of finger prostheses	To show a simplified method to produce an accurate impression of partially amputated fingers	The procedure reduced the chances of voids as uniform pressure could be applied during insertion of the impression cap (filled with impression material) into the defected finger	Level VI PubMed
Yadav, Chand, Jurel, 2016	India	Male: 0 Female: 1	21	Rehabilitation of single finger amputation with customized silicone prosthesis	To describe a method to fabricate ring retained silicone finger prosthesis in a patient with partial finger loss	A simple method to fabricate ring retained finger prosthesis was attempted and found successful	Level VI PubMed

RTA: Road traffic accident

for Quantitative Studies^[14] was used for quantitative studies and the articles were scored as strong, moderate, and low as described by Costa *et al.*^[15]

Data from the integrative review were converted into absolute (n) and relative (%) frequencies and analyzed by the statistical software R version 4.0.^[16]

RESULTS

Initially, 152 original articles were obtained and, after removing all duplicates, 109 unique citations were retained. Then, the inclusion/exclusion criteria were established, identifying 23 studies that comprised the final sample, as shown in Figure 1. In relation to the level of scientific evidence, the studies were classified as level IV and VI.

It was possible to identify that 17.2% of the articles were published in the years 2012 and 2016, and 13.0% in 2014 [Figure 2a]. Most studies describing the rehabilitation with silicone prosthesis for fingers were developed in India (69.9%; $n = 16$) [Figure 2b]. The age of the rehabilitated patients ranged from 12 to 84 years, with a mean age of 38.1 years [Figure 2c]. Finally, most studies were indexed in PubMed 57.5% ($n = 23$) [Figure 2d].

Table 2 represents the methodological quality of the qualitative studies included in this integrative literature review. All the included articles presented low risk of bias, evaluated with 57.2% ($n = 12$) of yes and five studies reached the maximum score. Questions “4: Is there congruity between the research methodology and the representation and analysis of data?,” “6: Is there a statement locating the researcher culturally or theoretically?,” and “7: Is the influence of the researcher on the research, and vice versa,

addressed?” were rated as not applied as they did not fit the type of study. Question nine rated negative.

The methodological quality of the quantitative articles is presented in Table 3. Studies scored with maximum values in categories of selection bias, blinding, and data collection methods.

DISCUSSION

This integrative literature review allowed to highlight studies that have rehabilitated patients with finger prostheses. Identifying such research becomes of fundamental importance since individuals rehabilitated by static or dynamic finger prostheses report an improvement in various functional movements, restoration of the appearance of naturalness, and significant changes in patients’ quality of life. Thus, profiles of patients wearing finger prostheses, the use of silicone to manufacture such prosthesis, the use of implant systems, retention devices, and their longevity will be discussed in this review.^[17,18]

Profile of patients using finger prostheses

There was a proportionality between men and women with amputated fingers. Despite that, longitudinal studies show a prevalence of women rehabilitated with silicone finger prostheses.^[2,3,19] This is justified by the fact that the absence of the limb can significantly interfere with women’s social interaction, femininity, and self-confidence, demonstrating

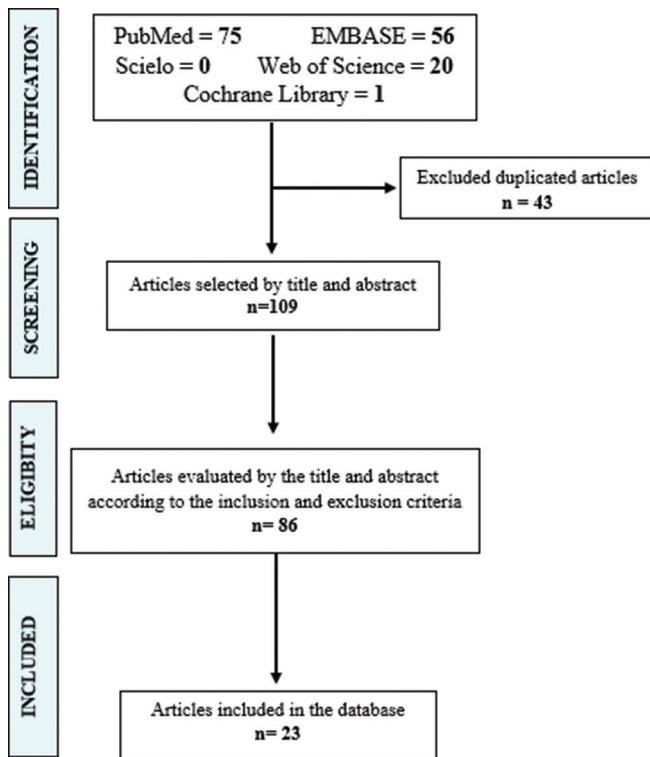


Figure 1: Flow-diagram of the identification, inclusion, and exclusion process

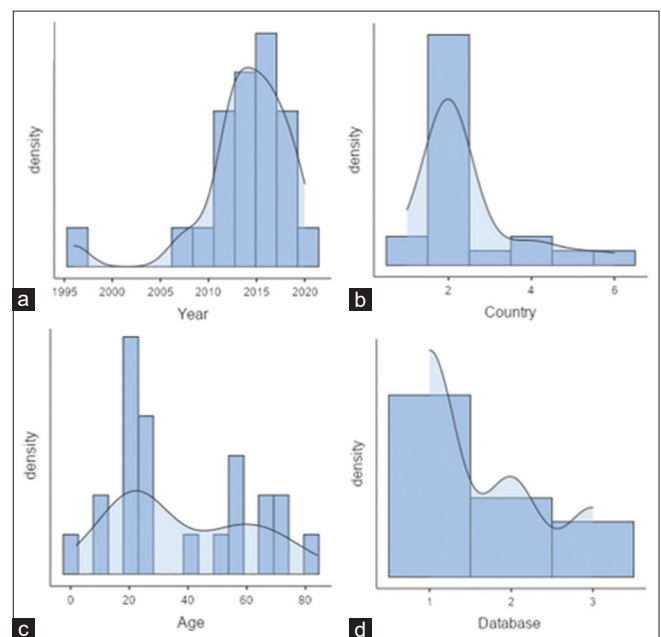


Figure 2: Main information of the selected articles. (a) Year of publication of the study. (b) Country in which the clinical case report or cross-sectional study was developed. (c) Age of the patients included. (d) Database in which the study is indexed

that in longitudinal studies the usability and clinical returns were preferentially by female patients.

The mean age of patients rehabilitated with silicone finger prostheses was 38 years, with a range of 12–84 years. Similar results were reported by Bamba *et al.*^[20] in their systematic review of ring avulsion injuries and reaffirmed by Struckmann *et al.*^[21] in their epidemiological studies of finger avulsion. The other significant factor observed in this study was the predominance of clinical case reports in India. The justification for such an incidence is due to the risks of accidents at work, in traffic, and in urban violence. These outcomes could be endorsed by Gupta *et al.*, (2012) in which 26.2% of amputations were associated with accidents at work, as well as 27.8% of cases were related to urban violence and traffic.

Table 2: Quality appraisal results: Qualitative studies

Authors (year)	1	2	3	4	5	6	7	8	9	10
Aduayom-Ahego, 2020	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	No	Yes
Aggarwal <i>et al.</i> , 2016	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	Yes*	Yes
Ahmad <i>et al.</i> , 2013	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	Yes*	Yes
Asnani <i>et al.</i> , 2015	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	No	Yes
Aydin <i>et al.</i> , 2007	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	No	Yes
Baheti <i>et al.</i> , 2014	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	No	Yes
Gaikwad <i>et al.</i> , 2019	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	Yes*	Yes
Goiato <i>et al.</i> , 2009	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	No	Yes
Goiato <i>et al.</i> , 2012	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	No	Yes
Goyal, Goel, 2014	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	Yes*	Yes
Jacob <i>et al.</i> , 2012	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	Yes*	Yes
Jain <i>et al.</i> , 2016	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	Yes*	Yes
Kumar <i>et al.</i> , 2012	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	Yes*	Yes
Mehta <i>et al.</i> , 2018	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	Yes*	Yes
Mehta <i>et al.</i> , 2019	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	Yes*	Yes
O'farrell <i>et al.</i> , 1996	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	No	Yes
Raghu <i>et al.</i> , 2013	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	Yes*	Yes
Saxena <i>et al.</i> , 2014	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	No	Yes
Thomas <i>et al.</i> , 2017	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	Yes*	Yes
Tripathi <i>et al.</i> , 2012	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	Yes*	Yes
Yadav, Chand, Jurel, 2016	Yes	Yes	Yes	NA	Yes	NA	NA	Yes	No	Yes

*Articles that presented only the letter of consent. NA: Not applicable, 1: Is there congruity between the stated philosophical perspective and the research methodology?, 2: Is there congruity between the research methodology and the research question or objectives?, 3: Is there congruity between the research methodology and the methods used to collect data?, 4: Is there congruity between the research methodology and the representation and analysis of data?, 5: Is there congruity between the research methodology and the interpretation of results?, 6: Is there a statement locating the researcher culturally or theoretically?, 7: Is the influence of the researcher on the research, and vice-versa, addressed?, 8: Are participant, and their voices, adequately represented?, 9: Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?, 10: Do the conclusions drawn in the research report flow from the analysis or interpretation, of the data?

Table 3: Quality appraisal results: Quantitative studies

Authors (year)	Criterion scores					
	Selection bias	Study design	Confounders	Blinding	Data collection methods	Withdrawals and drop-outs
Kuret <i>et al.</i> (2016)	Strong	Moderate	Low	Strong	Strong	Moderate
Kuret <i>et al.</i> (2018)	Strong	Moderate	Low	Strong	Strong	Moderate

Use of silicone in finger prostheses

Studies in this integrative review highlighted the use of silicone as the best material for the rehabilitation of missing fingers.^[22-27] A study conducted in India by Kuret *et al.*^[3] assessing the impact of silicone prosthesis on the performance of motor functions in 42 patients showed that the use of the silicone-made prostheses showed higher scores in motor development, as well as in the satisfaction of their usability. Other studies corroborate such findings in India^[17,28] and in Ghana.^[5] Likewise, the use of silicone finger prostheses showed a statistically significant improvement in range of motion, gripping power, cosmetic benefits, and quality of life (psychological state) of patients who opted for this rehabilitation.^[2]

Rehabilitation with customized ring wire substructure in finger prosthesis

The use of customized substructures for retention in silicone prosthesis for fingers was another important factor observed in this study. In this sense, a study conducted in India by Ahmad *et al.*^[29] describing the use of a metal substructure for the retention of the silicone prosthesis, showed satisfactory results in relation to the improvement in the psychological state and personality of the patient, after 3-years follow-up. Similarly, the use of structures attached to the prosthesis allowed patients to reestablish self-confidence, function, esthetic sense of the amputated fingers, and the routine use of this artificial finger.^[7,8,30]

Implant-retained finger prosthesis rehabilitation

The use of implant-retained silicone finger prostheses was also observed in this review. This device aims to promote retention and range of static and dynamic movement for the rehabilitated patient. Rehabilitation with a customized abutment (bone-integrated implant) provided the patient with superior retention compared to conventional prostheses, as well as safety in performing movements in India.^[31] These results could be reaffirmed in Brazil by Goiato *et al.*,^[32] Goiato *et al.*^[33] and in Turkey by Aydin *et al.*^[18] However, it was also observed that the high financial cost of installing bone-integrated implants was considered a limitation for its clinical use.

Longitudinal use of finger prostheses

In this context, rehabilitation using silicone finger prostheses has become a great option for patients, because

they have been able to restore function and esthetics as demonstrated in longitudinal studies.

O'farrell *et al.*^[19] evaluated the satisfaction and long-term use of custom-made prostheses in fifty prosthetic fingers. Their results showed that careful manufacturing, optimal installation, and longitudinal follow-up of these patients provide a better quality of life. Similarly, these findings could be reaffirmed by a 3-year follow-up clinical case report^[20] and by cross-sectional studies.^[2,3]

Partial study limitation

The inclusion of longitudinal clinical studies may be a partial limitation of this review, but they were necessary to expand our comprehension on the use of silicone finger prostheses. In addition, it was possible to identify what are the benefits that these prostheses provide to patients in addition to understanding their manufacturing technique.

CONCLUSION

Patients rehabilitated with silicone finger prostheses presented significant improvements in functional range of motion, restoration of self-esteem, and changes in quality of life. For this reason, new clinical research on the role and importance of silicone finger prostheses in amputee patients is needed, because the rehabilitation of these individuals is an important factor in functional capacity, providing psychological improvements, as well as promoting a more pleasant social interaction of rehabilitated patients.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Atroshi I, Rosberg HE. Epidemiology of amputations and severe injuries of the hand. *Hand Clin* 2001;17:343-50, vii.
2. Kuret Z, Burger H, Vidmar G, Maver T. Impact of silicone prosthesis on hand function, grip power and grip-force tracking ability after finger amputation. *Prosthet Orthot Int* 2016;40:744-50.
3. Kuret Z, Burger H, Vidmar G, Maver T. Adjustment to finger amputation and silicone finger prosthesis use. *Disabil Rehabil* 2019;41:1307-12.
4. Kumar L, Saloni JR, Mattoo KA, Yadav A. Finger prosthesis with an alternative approach. *J Coll Physicians Surg Pak* 2012;22:58-60.
5. Aduayom-Ahego A. Prosthetic rehabilitation of multiple-digit amputations using silicone material in sub-Saharan African country Ghana. *Pan Afr Med J* 2020;36:357.
6. Aggarwal H, Singh SV, Singh AK, Kumar P, Singh BP. Interdisciplinary approach for somatoprosthetic rehabilitation of a patient with clino-syndactyly and unusual dermatoglyphics. *Prosthet Orthot Int* 2016;40:763-6.
7. Mehta S, Agrawal R, Chitkeshi S, Nandeeshwar DB. Rehabilitation of missing digit using customized attachment supported prosthesis. *J Indian Prosthodont Soc* 2019;19:276-80.
8. Mehta S, Leela B, Karanjkar A, Halani AJ. Prosthetic rehabilitation of a partially amputated finger using a customized ring-wire substructure. *J Indian Prosthodont Soc* 2018;18:82-5.
9. Gaikwad AM, Ram SM, Nadgere JB, Shah NP. Recreating first digit with silicone prosthesis. *Natl J Maxillofac Surg* 2019;10:105-8.
10. Hermont AP, Zina LG, da Silva KD, da Silva JM, Martins-Júnior PA. Integrative reviews in dentistry: Concepts, planning and execution. *Arq Odontol* 2021;57:3-7.
11. Melnyk BM, Fineout-Overholt E. Evidence-Based Practice in Nursing and Healthcare: A Guide to Best Practice. Philadelphia, U.S.: Wolters Kluwer/Lippincott Williams and Wilkins; 2011.
12. Lockwood C, Munn Z, Porritt KJ. Qualitative research synthesis: Methodological guidance for systematic reviewers utilizing meta-aggregation. *JBHI Evidence Implement* 2015;13:179-87.
13. Anderson RJ, Bloch S, Armstrong M, Stone PC, Low JT. Communication between healthcare professionals and relatives of patients approaching the end-of-life: A systematic review of qualitative evidence. *Palliat Med* 2019;33:926-41.
14. Pennisi PR, Alves NC, Michelin PS, Medeiros-Souza L, Herval AM, Paranhos LR. The quality of life of family health professionals: A systematic review and meta-synthesis. *Rev Bras Enferm* 2020;73:e20190645.
15. Costa BC, dos Santos Azevedo GS, Ferreira PH, Almeida LM. Probiotics in reducing anxiety and depression symptoms: An integrative review. *Health Sci J* 2020;10:97-108.
16. R Core Team. Computing, RfFs. "R: A language and environment for statistical computing." Vienna: R Core Team (2013).
17. Asnani P, Shivalingappa CG, Mishra SK, Somkuwar K, Khan F. Rehabilitation of amputated thumb with a silicone prosthesis. *J Nat Sci Biol Med* 2015;6:275-7.
18. Aydin C, Karakoca S, Yilmaz H. Implant-retained digital prostheses with custom-designed attachments: A clinical report. *J Prosthet Dent* 2007;97:191-5.
19. O'Farrell DA, Montella BJ, Bahor JL, Levin LS. Long-term follow-up of 50 Duke silicone prosthetic fingers. *J Hand Surg Br* 1996;21:696-700.
20. Bamba R, Malhotra G, Bueno RA Jr., Thayer WP, Shack RB. Ring avulsion injuries: A systematic review. *Hand (N Y)* 2018;13:15-22.
21. Struckmann VF, Gaus S, Schilling T, Bickert B, Kneser U, Harhaus L. Digital avulsion injuries: Epidemiology and factors influencing finger preservation. *Arch Orthop Trauma Surg* 2020;140:1575-83.
22. Baheti SG, Saraf V, Gangadhar SA, Bhandari AJ, Rahul BS. Finger prosthesis – An attempt to simulate divine creations: A clinical case. *Pravara Med Rev* 2014;6:20-2.
23. Jacob PC, Shetty KH, Garg A, Pal B. Silicone finger prosthesis. A clinical report. *J Prosthodont* 2012;21:631-3.
24. Jain A, Walker FS, Ugrappa S, Makkad S, Ugrappa VK. Three-part mould technique for fabrication of hollow thumb prosthesis: A case report. *Prosthet Orthot Int* 2016;40:756-62.
25. Raghu KM, Gururaju CR, Sundaresh KJ, Mallikarjuna R. Aesthetic finger prosthesis with silicone biomaterial. *BMJ Case Rep* 2013;2013:bcr2013010385.
26. Saxena D, Jurel S, Gupta A, Dhillon M, Tomar D. Rehabilitation of digital defect with silicone finger prosthesis: A case report. *J Clin Diagn Res* 2014;8:ZD25-7.
27. Tripathi S, Singh RD, Chand P, Mishra N, Yadav LK, Singh SV.

- A modified approach of impression technique for fabrication of finger prostheses. *Prosthet Orthot Int* 2012;36:121-4.
28. Goyal A, Goel H. Prosthetic rehabilitation of a patient with finger amputation using silicone material. *Prosthet Orthot Int* 2015;39:333-7.
 29. Ahmad M, Balakrishnan D, Narayan A, Naim H. Comprehensive rehabilitation of partially amputated index finger with silicone prosthesis: A case report with 3 years of follow up. *J Indian Prosthodont Soc* 2014;14 Suppl 1:222-6.
 30. Yadav N, Chand P, Jurel SK. Rehabilitation of single finger amputation with customized silicone prosthesis. *Natl J Maxillofac Surg* 2016;7:89-91.
 31. Thomas B, Mathew CA, Perumal M, Marappan M. Osseo integrated finger prosthesis with a custom abutment. *J Indian Prosthodont Soc* 2017;17:212-6.
 32. Goiato MC, Mancuso DN, Marques Ferreira PP, dos Santos DM. Finger prosthesis: The art of reconstruction. *J Coll Physicians Surg Pak* 2009;19:670-1.
 33. Goiato MC, Dos Santos DM, Amoroso AP, Filho HG, De Carvalho Dekon SF. Implant-retained finger prosthesis with modified retention system. *Prosthet Orthot Int* 2013;37:324-8.

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