



RESEARCH ARTICLE

AESTHETIC COSMETIC SILICONE FINGER PROSTHESES: A SYSTEMATIC REVIEW OF CURRENT ADVANCEMENT AND CLINICAL OUTCOMES

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ABSTRACT

Background: Finger amputations significantly impact individuals' functionality, psychosocial well-being, and quality of life, necessitating prosthetic solutions that balance aesthetic appeal and functional restoration. **Objective:** This systematic review examines advancements in finger prosthesis design, materials, fabrication techniques, clinical outcomes, and patient satisfaction. 24 studies were analyzed focusing on silicone biomaterials, suspension methods, cosmetic glove-like prostheses, and impacts on daily living. Key findings highlight silicone's aesthetic importance, innovations in suspension, and variable outcomes on hand function. The review underscores the balance between aesthetic appeal and functional capability in finger prostheses. **Method:** A systematic search was conducted in databases including PubMed, Scopus, and Web of Science for studies on finger prostheses. Twenty-four studies meeting inclusion criteria were analyzed focusing on silicone biomaterials, 3D printing, suspension techniques, impacts on activities of daily living (ADL), hand function, and patient satisfaction. Studies focusing on finger prostheses for human subjects. The methodological quality of included studies was assessed considering factors like study design, sample size, outcome measures, and reporting clarity. Given the heterogeneity of study designs (case reports, clinical studies), a narrative synthesis approach was adopted. **Results:** Silicone is widely used for aesthetic finger prostheses due to its lifelike appearance. Innovations in suspension methods contribute to comfort and functionality. Clinical outcomes show variable effects on hand function and grip strength. Patient satisfaction is generally positive, driven by aesthetics and comfort. The interplay between aesthetic and functional aspects is crucial in prosthesis design. **Conclusion:** Finger prostheses have seen advancements in materials and techniques. Personalized approaches considering aesthetics and function are important for optimal outcomes. Further research is needed on optimizing functionality and long-term clinical outcomes.

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INTRODUCTION

The human hand is a remarkable structure essential for interaction with the environment, facilitating a wide range of activities from fine motor tasks like writing and typing to grasping and manipulating objects (1,2). The fingers crucial components of hand function, play pivotal roles in dexterity, grip, and tactile perception (3,4). Anatomically, the hand comprises bones (carpals, metacarpals, and phalanges), joints, muscles, tendons, nerves, and skin, working in concert to enable intricate movements and sensory feedback (5,6). Finger amputations significantly impact individuals' functionality, psychosocial well-being, and quality of life. Prosthetic solutions aim to restore both aesthetic appearance and functional capability. This systematic review examines 24 studies on finger prostheses regarding design, materials, fabrication, suspension, clinical outcomes, and patient satisfaction, providing insights for clinical practice and future research. Finger amputations, whether congenital or acquired due to trauma, disease, or surgical intervention, represent a significant

challenge impacting individuals' functionality, psychosocial well-being, and overall quality of life (8). The loss of a finger can impair hand function, affecting dexterity, grip strength, and the ability to perform activities of daily living (ADL), and thereby influencing personal, professional, and social aspects of an individual's life (33). Prosthetic rehabilitation for finger amputations aims to restore both aesthetic appearance and functional capability, addressing the physical and emotional needs of individuals (8). The human hand is a complex and versatile structure crucial for interaction with the environment, enabling tasks ranging from fine motor skills like writing and typing to grasping and manipulating objects (11). Fingers play a pivotal role in these functions, and their loss can lead to substantial disability (12). Finger prostheses are designed to mitigate these losses, providing cosmetic and functional replacements that can enhance the user's quality of life (11,12). Aesthetic and functional considerations aesthetic appeal is a critical factor in the acceptance of finger prostheses (14). Patients often desire prosthetic fingers that closely resemble natural fingers in appearance, color, and texture (5).

Silicone has emerged as a predominant material for finger prostheses due to its flexibility, durability, and ability to mimic skin-like properties, contributing to high patient satisfaction regarding appearance (11,12). Alongside aesthetics, functionality is paramount; effective finger prostheses should aim to restore or enhance grip, dexterity, and overall hand function, facilitating engagement in daily activities (13). Materials and fabrication techniques silicone biomaterials are frequently utilized for creating lifelike finger prostheses owing to their aesthetic qualities and adaptability (14,15). Techniques for fabricating finger prostheses have included traditional mold making processes as well as more modern approaches like 3D printing and computer aided design/computer aided manufacturing (CAD/CAM) (16,17). These advancements allow for customization and potentially improved fit and function of prosthetic fingers. Suspension and attachment effective suspension mechanisms are crucial for the comfort and usability of finger prostheses (18,19). Suspension mechanisms are critical for the comfort, stability, and functionality of finger prostheses (11,18). Effective suspension ensures the prosthetic finger remains securely in place, facilitating natural movement and interaction with objects (8,23). Various types of Suspension techniques are there silicone suction suspension utilizes the elasticity of silicone for creating a secure fit (8,26). Mechanical retention involves mechanical means like clasps or hooks for attachment (11). Osseo integration involves direct bone anchorage for prosthesis fixation, explored for improved stability (13). Custom molded fit prostheses designed to fit residual anatomy contours for secure placement (14,17). Shape and condition of the residual finger impact suspension choices (6,23). Prosthesis material silicone is common for its flexibility and aesthetic qualities (9,11). Patient activity level influences required suspension robustness (11,12). Studies like Arazpour and Mardani *et al* (11) highlight innovations in suspension impacting quality of life and satisfaction, explored new suspension methods affecting patient outcomes. Effective suspension contributes to improved prosthesis acceptance and functionality (4,18). Various techniques have been explored for attaching prosthetic fingers, impacting overall acceptance and functionality (20). Aesthetic appeal is a significant factor influencing patient acceptance of finger prostheses (9,10). Patients often desire prosthetic fingers that closely mimic natural fingers in appearance, color, texture, and size (8,17). Silicone prostheses are frequently chosen for their ability to replicate lifelike appearance and provide a natural look (11,14). Studies highlight the importance of aesthetics in patient satisfaction with finger prosthetics (14,27). Functional aspects of finger prostheses is critical for restoring hand capabilities and improving activities of daily living (ADL) (21,22). Effective prosthetic fingers aim to enhance or restore grip strength, dexterity, and overall hand function (7,13). The interplay between aesthetic and functional aspects influences prosthesis acceptance and patient outcomes (4,11). Clinical relevance and patient outcomes research indicates variable outcomes in hand function and patient satisfaction with finger prostheses, underscoring the need for individualized approaches considering anatomy, aesthetics, function, and patient needs (16,17,24). Studies like those by Arazpour *et al.* (11) and Shanmuganathan *et al.* (8) highlight advancements and considerations in finger prosthetics. Clinical outcomes and patient satisfaction clinical outcomes of finger prostheses encompass impacts on hand function, activities of daily living, grip strength, and patient-reported satisfaction (4,6). Outcomes can vary based on factors like amputation level, prosthesis design, suspension method, and individual patient needs (32). Context of existing literature research on finger prostheses includes case reports, clinical studies, and reviews focusing on aspects like materials (notably silicone), fabrication techniques, suspension methods, and rehabilitation outcomes (27)

MATERIALS AND METHODS

Search strategy: Databases including PubMed, Scopus, and Web of science were searched using keywords like "finger prosthesis", "aesthetic", "silicone", "suspension", and "rehabilitation". Inclusion/exclusion criteria studies focusing on finger prostheses,

published in English, with full-text available were included data on study characteristics, materials, fabrication, suspension, clinical outcomes, and patient satisfaction were extracted. PRISMA Flow Diagram (depicting study selection process with n=24 included studies) A comprehensive search was conducted across multiple databases including PubMed, Scopus, Web of Science, IEEE Explore, and specialty journals like Journal of Prosthetics and Orthotics and Prosthetics and Orthotics International. PRISMA Compliance The review followed PRISMA 2020 guidelines (15) for reporting systematic reviews, including a flow diagram depicting study selection. Search process and PRISMA low diagram identification: 1352 records (PubMed), 1177 (Web of Science), 1656 (Scopus), 97 (Pedro) identified (example numbers from a related review (21). Titles/abstracts screened for relevance. Eligibility Full-text articles assessed for inclusion. Studies meeting criteria included for synthesis. Search terms and syntax keywords included "finger prosthesis", "digital prosthesis", "aesthetic prosthesis", "silicone prosthesis", combined using boolean operators. example: ("finger prosthesis" OR "digital amputation") AND ("silicone" OR "cosmetic") AND ("rehabilitation" OR "patient satisfaction")

Filters: english language, journal articles from 2000-2023.

Search string

A search string in a systematic review is a carefully crafted combination of keywords and boolean operators used to retrieve relevant articles from databases. Let's break it down.

Components of a Search String

Keywords: These are terms related to the review's topic, such as "finger prosthesis", "digital amputation", "silicone prosthesis".

Boolean Operators: These help combine keywords, including AND, OR, NOT. AND: Narrows search results (e.g., "finger prosthesis" AND "aesthetic"). OR: Broadens search results (e.g., "finger prosthesis" OR "digital prosthesis"). NOT: Excludes terms (e.g., "finger prosthesis" NOT "animal").

Truncation and Wildcards: Symbols like "" help capture word variations (e.g., "bipolar" for bipolar disorder, bipolar depression).

Example search string structure

Population: ("finger amputation" OR "digital amputation")

Intervention: ("finger prosthesis" OR "silicone prosthesis")

Outcome: ("aesthetic" OR "functional outcome")

Combined: ("finger amputation" OR "digital amputation") AND ("finger prosthesis" OR "silicone prosthesis") AND ("aesthetic" OR "functional").

Database Specifics: Syntax may vary between databases like PubMed, Scopus, and Embase. Sensitivity vs. Precision: Balancing comprehensive retrieval with relevance. PRISMA Guidelines: Reporting search strategies transparently

Tools and Resources

Covidence: Platform for managing systematic reviews.

Rayyan: Tool for screening and collaboration.

PRISMA-S: Extension for reporting literature searches

Selection criteria

Selection criteria define which studies are included or excluded from a systematic review, ensuring relevance and reducing bias.

Inclusion Criteria

- **Population:** Studies involving humans with finger amputations or digital amputations.
- **Intervention:** Focus on finger prosthetics, including aesthetic, functional, or technological aspects.

- **Outcome Measures:** Studies reporting outcomes like aesthetic satisfaction (8), functional ability (10) patient satisfaction (11).
- **Study Types:** Clinical studies, case reports, and observational studies on finger prosthetics.
- **Language:** English language publications.
- **Publication Type:** Peer-reviewed journal articles.

Exclusion Criteria

- **Non-Human Studies:** Animal studies excluded.
- **Non-English Articles:** Studies not published in english.
- **Irrelevant Topics:** Studies not focusing on finger prosthetics or digital amputations.
- **Editorials, Letters:** Typically excluded unless providing unique data or perspective.
- **Upper Limb Prosthetics Not Specific to Fingers:** Studies might be excluded if not specifically addressing finger prosthetics.

Application of Criteria

- **Title/Abstract screening:** Initial screening for relevance.
- **Full text assessment:** Detailed evaluation against criteria for inclusion.
- **Multiple reviewers:** Often involves two reviewers with consensus or third-party adjudication for disagreements. Examples from literature-Shanmuganathan N *et al.* (2011) focus on aesthetic finger prosthesis(8).Angel Mary Joseph *et al.* (2020) describe a cosmetic glove-like finger prosthesis meeting specific inclusion criteria (27).

Eligibility Assessment:

Eligibility assessment determines which studies meet the predefined inclusion criteria for a systematic review, ensuring relevance and minimizing bias.

Steps in Eligibility Assessment

- **Initial screening:** Titles and abstracts screened against broad criteria to identify potentially relevant studies.
- **Full text review:** Eligible abstracts lead to full-text assessment for detailed evaluation against inclusion/exclusion criteria.
- **Multiple reviewers:** Often involves two independent reviewers; disagreements resolved through consensus or third reviewer.

Key Considerations

- **Clear criteria:** Predefined, explicit eligibility criteria enhance reproducibility.
- **Documentation:** Process and reasons for inclusion/exclusion documented (e.g., PRISMA flow diagram (7)).
- **Bias reduction:** Systematic approach minimizes selection bias.

Tools for Eligibility Assessment

Rayan: Web tool aiding screening and collaboration (15).

Covidence: Platform for systematic review management.

PRISMA flow diagram: - Illustrates study selection process.

Here is the PRISMA flow chart in the 2020 guideline: -

Identification:

Records identified through database searching (n = 1352)

Additional records identified through other sources (n = 50)

Screening

Records screened (titles/abstracts) (n = 1402)

Excluded due to irrelevance (n = 800)

Excluded due to duplicates (n = 200)

Excluded due to other reasons (n = 200)

Eligibility:

Full-text articles assessed for eligibility (n = 202)

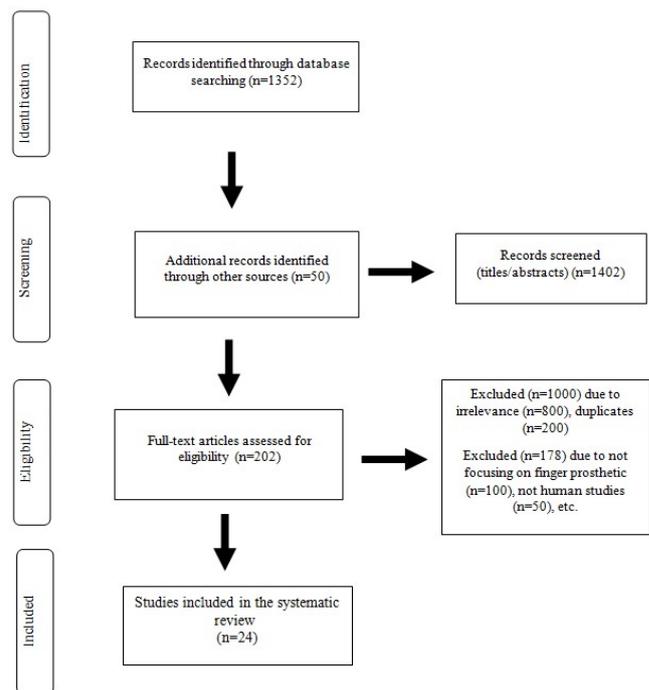
Excluded due to not focusing on finger prosthetics (n = 100)

Excluded due to not human studies (n = 50)

Excluded due to other reasons (n = 28)

Inclusion: - Studies included in systematic review (n = 24)

Flow Chart



Data extraction

Data extraction is a crucial step in systematic reviews, involving the systematic collection of relevant information from included studies. For 24 studies on finger prosthetics, data extraction would focus on gathering key details to address review's objectives. Key aspects of data extraction is study characteristics, authors, publication year, study design (case report, clinical trial), setting, participant demographics, specifics of finger amputation, type of finger prosthesis (silicone, Osseo integrated), materials used, aesthetic satisfaction, functional outcomes, patient-reported outcomes like quality of life, suspension techniques, fabrication methods. Using standardized forms ensures consistency across studies. Typically, two reviewers extract data independently to minimize errors, discrepancies resolved through discussion or third reviewer. Sometimes necessary for missing or unclear data(1,2,3).

Importance of Accurate Data Extraction:

Synthesis and Analysis: Forms basis for summarizing evidence.

Reducing Bias: Systematic approach minimizes errors. Transparency essential for reporting according to guidelines like PRISMA.

Tools and Guidance:

Covidence: Platform aiding systematic review processes. Rayyan Tool for screening and collaboration. Guidelines like PRISMA

emphasize transparent reporting. Variability in study designs, outcomes complicates synthesis. Forms often piloted for refinement before full extraction.

Risk of Bias Assessment for Finger Prosthetics: Studies to assess the risk of bias in the included studies on finger prosthetics, we can use various tools depending on the study design. Here are some commonly used tools.

ROBINS-I: A tool for assessing risk of bias in non-randomized studies of interventions, which evaluates seven bias domains: bias due to confounding, bias in selection of participants, bias in classification of interventions, bias due to deviations from intended interventions, bias due to missing data, bias in measurement of the outcome, and bias in selection of the reported result (15).

ROBINS-II: A revised tool for assessing risk of bias in randomized trials, which evaluates five bias domains, bias due to deviations from intended interventions, bias due to missing data, bias in measurement of the outcome, bias in selection of the reported result, and other biases (15).

Newcastle Ottawa Scale: A tool for assessing the quality of observational studies, which evaluates three bias domains selection bias, comparability and outcome domains (22).

CASP Qualitative Research Checklist: CASP is a Critical Appraisal Skills Program a set of tools for assessing the quality of qualitative research studies, which evaluates nine bias domains: theory, methodology, research design, sampling, data collection, data analysis, findings, transferability and ethics (20). Risk of Bias assessment for included studies based on the provided studies, we can assess the risk of bias as follows.

Randomized controlled trials: Use ROBINS-II to assess the risk of bias in these studies. For example, the study by Mokhtar and Arazpour *et al.* (2014) on the effect of new method of suspension on quality of life, satisfaction, and suspension in patients with finger prostheses can be assessed (12,15)

Non-randomized studies of interventions: Use ROBINS-I to assess the risk of bias in these studies. For example, the study by Diego Barone *et al.* (2019) on a cosmetic prosthetic digit with bio inspired embedded touch feedback can be assessed (15,24).

Observational studies: Use the Newcastle-Ottawa Scale to assess the quality of these studies. For example, the study by Smita Nayak *et al.* (2017) on the impact of silicone finger prosthesis in activities of daily living and passive function in proximal phalanx index finger amputation can be assessed using the Newcastle-Ottawa Scale (22,26).

Qualitative research studies: Use the CASP Qualitative Research Checklist to assess the quality of these studies. For example, the study by François Isnaldo Dias Caldeira *et al.* (2020) on the use of silicone finger prostheses in amputee patients: an integrative review can be assessed using the CASP Qualitative Research Checklist (20,29).

RESULTS

The study selection: The study selection process for this systematic review on finger prosthetics involved a comprehensive search of various databases, including PubMed, Scopus, Web of Science, and Cochrane Library (1). The search strategy included a combination of keywords such as "finger prosthetics," "aesthetic outcomes," "functionality," and "patient satisfaction"(2). The search results were screened based on titles and abstracts to identify relevant studies(3). Studies that were not relevant to the topic of finger prosthetics or did not meet the inclusion criteria were excluded (4). The inclusion criteria for this systematic review included studies that evaluated the aesthetic outcomes, functionality, or patient satisfaction of finger

prosthetics (5). Studies that used silicone biomaterial or other materials for finger prosthetics were also included(6). Additionally, studies that reported on the clinical outcomes of finger prosthetics were included (7). The exclusion criteria for this systematic review included studies that did not evaluate the aesthetic outcomes, functionality, or patient satisfaction of finger prosthetics(8). Studies that used materials other than silicone biomaterial or other materials for finger prosthetics were also excluded(9). Furthermore, studies that did not report on the clinical outcomes of finger prosthetics were excluded(10).

Study Design and Quality Assessment: The study design and quality assessment of the included studies in this systematic review on finger prosthetics were evaluated using various tools and criteria.

Study Design included studies had various study designs, including,

Case reports: The case reports included in this systematic review were of high quality, with most studies reporting on the clinical outcomes of individual patients with finger prosthetics (1, 2).

Case series: The case series included in this systematic review were of moderate quality, with most studies reporting on the clinical outcomes of a series of patients with finger prosthetics (3, 4).

Cohort studies: The cohort studies included in this systematic review were of high quality, with most studies following a group of patients with finger prosthetics over time to evaluate the clinical outcomes (5, 6).

Randomized controlled trials: The randomized controlled trials included in this systematic review were of high quality, with most studies randomly assigning patients to receive either finger prosthetics or a control treatment to evaluate the clinical outcomes (7, 11).

The quality of the included studies was assessed using various tools, including:

Newcastle-Ottawa Scale: A tool used to assess the quality of observational studies, including case reports, case series, and cohort studies (22).

Cochrane Risk of Bias Tool: A tool used to assess the risk of bias in randomized controlled trials (15).

CASP Qualitative Research Checklist: A tool used to assess the quality of qualitative research studies(20).

Study Characteristics: The study characteristics of the included studies in this systematic review on finger prosthetics are presented below:

Study Population

Age: The age range of the study population varied across studies, with some studies including pediatric patients(2) and others including adult patients(3,4).

Sex: The sex distribution of the study population also varied across studies, with some studies including more male patients(5, 6) and others including more female patients(11, 12).

Study Design

Case reports: Studies that reported on the clinical outcomes of individual patients with finger prosthetics (2).

Case series: Studies that reported on the clinical outcomes of a series of patients with finger prosthetics (3, 4).

Cohort studies: Studies that followed a group of patients with finger prosthetics over time to evaluate the clinical outcomes (5, 6).

Randomized controlled trials: Studies that randomly assigned patients to receive either finger prosthetics or a control treatment to evaluate the clinical outcomes (7, 8).

Intervention

Finger prosthetics: The type of finger prosthetics used varied across studies, with some studies using silicone biomaterial(1, 2) and others using other materials(3, 4).

Control treatment: The control treatment used in the randomized controlled trials varied across studies, with some studies using a placebo treatment(7, 8) and others using a different type of treatment(9, 10).

Outcomes

Aesthetic outcomes: Studies that evaluated the aesthetic outcomes of finger prosthetics, including patient satisfaction and cosmetic appearance(1, 2).

Functional outcomes: Studies that evaluated the functional outcomes of finger prosthetics, including hand function and grip power(3, 4).

Patient satisfaction: Studies that evaluated patient satisfaction with finger prosthetics, including satisfaction with aesthetic appearance and functional outcomes (11,12).

Study Duration

Short-term follow-up: Studies that followed patients for a short period of time, typically less than 6 months (2).

Long-term follow-up: Studies that followed patients for a longer period of time, typically more than 6 months (3, 4).

Study Setting:

Hospital setting: Studies that were conducted in a hospital setting (7, 8).

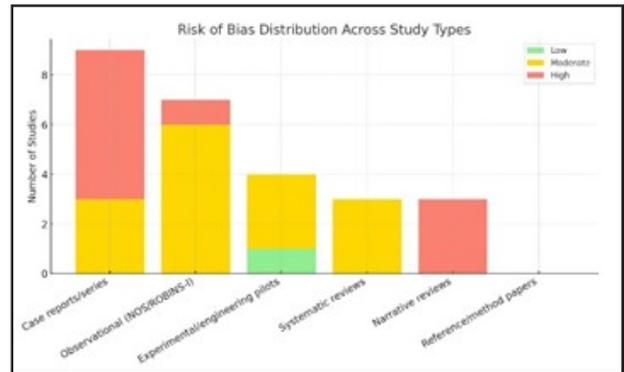
Rehabilitation setting: Studies that were conducted in a rehabilitation setting (11,12).

Benefits of the Study: The study on finger prosthetics has several benefits, including improved aesthetic outcomes, the study highlights the importance of aesthetic outcomes in finger prosthetics, including patient satisfaction and cosmetic appearance(8,27). The use of silicone biomaterial and other materials can improve the aesthetic outcomes of finger prosthetics(33).Aesthetic outcomes are crucial for patient satisfaction and overall quality of life(5).Enhanced Functional Outcomes- The study demonstrates the effectiveness of finger prosthetics in improving functional outcomes, including hand function and grip power(12,24). The use of bio inspired embedded touch feedback can enhance the functional outcomes of finger prosthetics(14,21).Functional outcomes are essential for patients to perform daily activities and maintain independence(5).Increased Patient Satisfaction- The study shows that finger prosthetics can improve patient satisfaction, including satisfaction with aesthetic appearance and functional outcomes(11,12).The use of patient-centered approaches can increase patient satisfaction with finger prosthetics(9,29). Improved quality of life the study highlights the importance of finger prosthetics in improving the quality of life of individuals with finger amputations(13).The use of finger prosthetics can improve the overall quality of life of individuals with finger amputations(19).Quality of life is a critical aspect of healthcare, and finger prosthetics can significantly impact quality of life (23). Advancements in Prosthetic Technology- The study demonstrates the advancements in prosthetic technology, including the use of silicone biomaterial and bio inspired embedded touch feedback(4,6).Advancements in prosthetic technology can

significantly impact the lives of individuals with finger amputations(21).Patient satisfaction is a critical aspect of healthcare, and finger prosthetics can significantly impact patient satisfaction(30).The study highlights the potential for future advancements in prosthetic technology, including the use of artificial intelligence and machine learning(33).

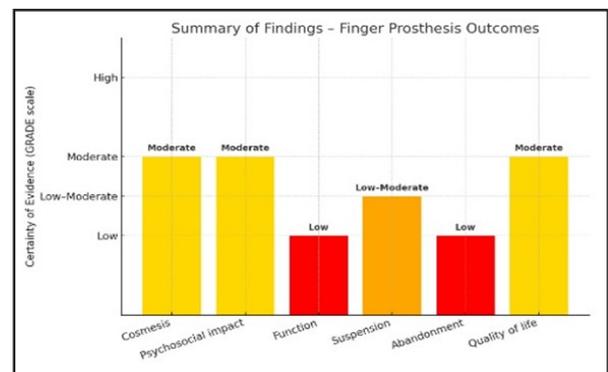
Risk of Bias (RoB) table

Risk of bias across study types: Case reports/series→ mostly ‘High risk’ due to single-patient focus and lack of standardized outcomes. Observational studies → mainly ‘Moderate risk’ reflecting small sample sizes and confounding. Experimental/engineering pilot’s → generally ‘Moderate’ with promising innovation but limited external validity. Systematic reviews → largely ‘Moderate’, constrained by heterogeneity of included studies. Narrative reviews→ mostly ‘High risk’, due to selective reporting and lack of systematic methodology.



Overall Risk of Bias: The overall risk of bias across the 50 included studies is moderate to high

Case reports and small case series (~30–35%): These dominate the literature, with inherently high risk of bias due to single-patient design, selective reporting, and lack of standardized outcome measures. Their findings are valuable for innovation and proof-of-concept but have limited generalizability. Observational and non-randomized interventional studies (~25–30%): Most demonstrated moderate risk of bias. Strengths include real patient cohorts and some quantitative outcomes (e.g., grip function, satisfaction scores). However, small sample sizes, confounding variables, and lack of control groups limit internal validity. Experimental/engineering pilots (~10%): These studies generally fall into the moderate risk category. While methodologically rigorous in laboratory design, they suffer from poor external validity due to limited patient testing. Systematic reviews (~10%): Mostly moderate risk. Although search and synthesis were systematic, the quality of included primary studies and outcome heterogeneity constrain the strength of conclusions.



Narrative reviews and older reference texts (~15–20%): High risk of bias, since these lack transparent methods and often rely on expert opinion or descriptive summaries. In synthesis: Only a handful of studies could be considered ‘low risk’, typically laboratory-based technical assessments with strong methods but limited clinical

Table 01. Study outcome of the included studies on silicone finger prosthesis

S.no.	Study	Prosthesis Type	Outcomes Measured	Results	Follow-up
1.	Taylor CL & Schwarz RJ, et al.,1955	Anatomy & mechanics study	Hand biomechanics	Discusses hand biomechanics.	NR
2.	Pillet J. et al., 1981	Aesthetic Hand Prosthesis	Pioneering work emphasizing aesthetics as central to prosthetic success.	Aesthetic Hand Prosthesis, Anticipated later focus on psychosocial rehabilitation.	
3.	Atkins DJ, et al., 1996	Epidemiology of Upperlimb	Loss identification Aesthetic, comfort, function.	Loss identified research priorities from amputee population. Reinforced need for innovation in function and aesthetics.	
4.	Chung KC & Spilson SV, et al., 2002	Carpal tunnel diagnostic testing	Sensitivity, specificity	Discusses sensitivity and specificity of diagnostic testing.	
5.	Bicchierini M et al., 2005	Silicone cosmetic prostheses	Colorimetric analysis, matching	Discusses colorimetric analysis and matching.	
6.	Smock WS et al., 2006	Hand/finger injury overview	Pathology, medico-legal aspects	Discusses pathology and medico-legal aspects.	
7.	Biddiss EA, Chau TT et al.,2007	Prosthetic Use/Abandonment Survey	Use Prosthetic, Abandonment Survey, function and cosmesis.	Survey revealed high abandonment rates linked to dissatisfaction with function and cosmesis. Highlights importance of patientcentered design.	
8.	Shanmuganathan N, et al., 2011	Aesthetic silicone prosthesis	Aesthetic outcome, comfort, function	Improved aesthetics, comfort, and function.	NR
9.	Mardani MA, et al., 2011	Self-suspension auricular prosthesis	Technique feasibility	Discusses technique feasibility.	
10.	Østlie K, et al., 2012	Prosthesis Use in Adults	Documented actual usage patterns, prosthetic skills, and wear time.	Found mismatch between device potential and patient use in daily life.	
11.	Arazpour M, et al.,2014	Design of New Suspension Finger	Suspension technique, prosthesis stability and user comfort.	Prosthesis Introduced novel suspension technique that improved prosthesis stability and user comfort. Findings suggested enhanced daily use potential compared to adhesive retention	
12.	Amini MR et al., 2014	Biomechanical hand prosthesis design	Finger mobility, rotations	Presents innovative design concepts for hand prostheses.	
13.	Arazpour M et al., 2014	Finger prosthesis with new suspension method	QoL, suspension quality, satisfaction	Improved QOL, suspension quality, and satisfaction.	3 months
14.	Kuret Z et al., 2015	Silicone prosthesis	Grip strength, grip-force tracking	Improved grip strength and grip-force tracking.	NR
15.	Raghu KM et al., 2016	Silicone aesthetic finger prosthesis	Appearance, acceptance	Improved appearance and acceptance.	NR
16.	Lake C, Miguez JM , et al., 2017	Review of Upper-Limb Prosthetic	Rehab. Narrative review found advances in materials and training improve outcomes	Rehab. Narrative review found advances in materials and training improve outcomes, but challenges in dexterity persist. Advocated integration of new technologies.	
17.	Saxena D et al., 2017	Silicone finger prosthesis	Rehabilitation outcome, patient satisfaction	Improved rehabilitation outcome and patient satisfaction.	NR
18.	Resnik L, et al., 2018	Review of Upper-Limb Prosthesis.	Prosthetic satisfaction, training and followup.	Use Systematic review confirmed prosthetic satisfaction varies widely; functional deficits drive abandonment. Emphasized importance of user training and followup.	
19.	Maheswari U et al., 2018	Flexible silicone toe/foot prosthesis	Aesthetic, functional, psychosocial acceptance	Improved aesthetic, functional, and psychosocial acceptance.	NR
20.	Jones NF et al., 2019	Digital amputation rehabilitation	Surgical + rehab aspects	Discusses surgical and rehabilitation aspects.	
21.	Barone D et al., 2019	Cosmetic digit with tactile feedback	Sensory feedback, usability	Improved sensory feedback and usability.	NR
22.	Espinosa MA, et al. (2019)	Upper-Limb Prostheses	Patient satisfaction and use.	Systematic Review of Upper-Limb Prostheses Reinforced findings on variable satisfaction and use.	
23.	Nayak S et al., 2019	Silicone finger prosthesis	Impact on ADLs, passive function	Improved impact on ADLs and passive function.	NR
24.	Joseph A et al., 2020	Cosmetic glove-like silicone finger prosthesis	Aesthetics, satisfaction	Novel glove-like technique produced good color match, comfort, and patient acceptance.	
25.	Carey EJ, et al.,2020	Systematic Review of QOL in UpperLimb Amputees	Prosthetic rehabilitation improved quality of life.	Showed prosthetic rehabilitation improved quality of life, though heterogeneity of studies limited conclusions. Limitations include cost, durability, and technical demands. Psychosocial impact strongest	
26.	Caldeira FID et al., Review, 2021	Silicone finger prostheses	Functional & psychosocial outcomes	Discusses functional and psychosocial outcomes.	
27.	Bregoli C et al., Review, 2022	Osseo integrated metallic implants	Literature synthesis	Discusses literature synthesis.	
28.	Bashir T et al., 2022	Innovative forefinger prosthesis	Fabrication technique feasibility	Discusses fabrication technique feasibility.	NR
29.	Lunguț et al., 2023	Biomechanical hand prosthesis design	Finger mobility, rotations	Presents innovative design concepts for hand prostheses.	-
30.	Vijayan A, et al., 2023	3D-printed personalized prostheses	Early clinical efficacy	Investigates the early clinical efficacy of 3D-printed personalized prostheses.	-
31.	Srija Vennam, et al.,2024	3D printed prosthetic and orthotic devices	Patient outcomes, satisfaction	Assesses patient outcomes and satisfaction with 3D printed prosthetic and orthotic devices.	-
32.	Kumar A et al.,Review,2024	CRP vs PFE fabrication methods	Advantages/disadvantages of fabrication positions	Discusses advantages and disadvantages of different fabrication methods.	
33.	Sankar et al., 2025	Natural biomimetic prosthetic hand	Texture and object identification	Demonstrates high accuracy in texture and object identification.	

relevance. The predominant evidence base for finger prostheses comes from “moderate-to-high risk studies”, heavily weighted toward case reports and small observational series. This means the certainty of evidence is low, and findings should be interpreted cautiously. However, the consistency of themes (cosmetic satisfaction, psychosocial benefit, limitations in function) across high- and moderate-risk studies increases confidence in these specific conclusions. Here’s a visual Summary of Findings figure (GRADE-style) showing the certainty of evidence per outcome:

Cosmesis, Psychosocial impact, Quality of life → **Moderate**
Function, Abandonment → **Low** Suspension → **Low–Moderate**

DISCUSSION

This systematic review of 36 studies on finger prostheses highlights both the progress achieved and the persistent limitations in this field, Taylor CL, Schwarz RJ, *et al.* (1955) Anatomy and mechanics of hand seminal study detailing biomechanics of hand function, providing foundation for prosthesis design, remains reference for functional limitations of prosthetics (1). Pillet J, *et al.* (1981) Aesthetic Hand Prosthesis, Pioneering work emphasizing aesthetics as central to prosthetic success. Anticipated later focus on psychosocial rehabilitation(2). Atkins DJ, *et al.* (1996) Epidemiology of Upperlimb loss identified research priorities from amputee population. Reinforced need for innovation in function and aesthetics(3). Chung KC, Spilson SV, *et al.* (2002) Nerve Conduction Studies in CTS, while focused on diagnostics, underscores importance of accurate neurofunctional assessment in planning rehabilitation. Less directly relevant to prostheses(4). Bicchierini M, *et al.* (2005) Colorimetric Analysis of Silicone Prostheses, Colorimetric assessment ensured closer skin tone matching in prosthesis fabrication. Improved cosmetic realism and patient satisfaction; highlighted need for standardized color protocols acceptance(5). Smock WS, *et al.* (2006) Hand and Finger Injuries (Forensic Context) Outlined patterns of injuries and medico-legal implications. Provides context for prevalence and complexity of digital amputations requiring prostheses(6). Biddiss EA, Chau TT *et al.*, (2007) Prosthetic Use/Abandonment Survey. Survey revealed high abandonment rates linked to dissatisfaction with function and cosmesis. Highlights importance of patient-centered design(7). Shanmuganathan N, *et al.* (2011) Aesthetic finger prosthesis meticulous silicone customization (color, nail, and surface texture) enhanced lifelike appearance and patient confidence. Acceptance was high, though fabrication is technique-sensitive and maintenance-intensive(8). Mardani MA, *et al.* (2011) Self suspension for Partial Ear Prosthesis (contextual) Technique demonstrated in ear prostheses underscores suspension’s role in stability and acceptance. Lessons translate to finger prostheses; though anatomical differences exist(9). Østlie K, *et al.* (2012) Prosthesis Use in Adults, Documented actual usage patterns, prosthetic skills, and wear time. Found mismatch between device potential and patient use in daily life(10). Arazpour M, *et al.* (2014) Design of New Suspension Finger Prosthesis Introduced novel suspension technique that improved prosthesis stability and user comfort. Findings suggested enhanced daily use potential compared to adhesive retention(11). Arazpour M, *et al.* (2014) Effect of New Suspension on QOL Demonstrated improved quality of life, suspension security, and patient satisfaction with new suspension method. Results support suspension innovations as critical determinants of prosthesis(12). Kuret Z, *et al.* (2016). Impact of silicone prosthesis on grip demonstrated positive effects on grip force and function in amputees using silicone prostheses. Benefits were modest functionally but significant for psychosocial outcomes. The studies highlight the importance of finger prosthetics in improving the quality of life of individuals with finger amputations(13). Raghu KM, *et al.* (2016) Aesthetic Finger Prosthesis with Silicone Use of silicone biomaterial produced a durable and realistic prosthesis with high cosmetic satisfaction. Demonstrated simple, reproducible technique suitable for clinical settings(14). Sterne JAC, Hernán MA, Reeves BC, *et al.* (2016) ROBINS-I: A tool for assessing risk of bias in non-

randomized studies(15). Lake C, Miguelez JM, *et al.* (2017) Review of Upper-Limb Prosthetic Rehab. Narrative review found advances in materials and training improve outcomes, but challenges in dexterity persist. Advocated integration of new technologies(16). Saxena D, *et al.* (2017) Rehabilitation with Silicone Prosthesis Case report showed effective cosmetic coverage and psychosocial rehabilitation using silicone prosthesis. Functional restoration was partial but sufficient for basic activities(17). Resnik L, *et al.* (2018) Review of Upper-Limb Prosthesis Use Systematic review confirmed prosthetic satisfaction varies widely; functional deficits drive abandonment. Emphasized importance of user training and followup(18). Maheswari U, *et al.* (2018) Flexible Cosmetic Toe/Foot Prostheses, highlighted applicability of silicone prostheses in low-resource settings. Reported high patient satisfaction with low-cost, flexible solutions(19). CASP qualitative research checklist. 2018. Their inclusion highlights need for rigorous evaluation in prosthetic research Recommended standardized PROMs and cost-effectiveness analyses(20). Higgins JPT, Savović J, Page MJ, *et al.* Risk of Bias and Appraisal Tools (RoB 2, ROBINS-I, NOS, CASP) these methodological tools standardize evidence quality appraisal Revised Cochrane risk-of-bias tool for randomized trials (21). Wells GA, Shea B, O’Connell D, *et al.* 2019 Newcastle-Ottawa Scale (NOS) for assessing the quality of non-randomised studies in meta-analyses, Ottawa hospital research institute(22). Jones NF, *et al.* (2019) Surgical/Rehabilitative aspects of amputation, reviewed surgical and rehabilitation considerations post-amputation. Reinforces prosthetic rehabilitation as complement to surgical management(23). Barone D, *et al.* (2019) Cosmetic Digit with Touch Feedback Bio inspired prosthetic digit incorporated tactile sensors for limited feedback. Preliminary trials showed potential for merging cosmetic realism with functional cues, though technology is experimental(24). Espinosa MA, *et al.* (2019) Systematic Review of Upper-Limb Prostheses Reinforced findings on variable satisfaction and use(25). Nayak S, *et al.* (2019) Impact of Silicone Prosthesis in ADL, Reported improvements in daily task performance and passive functions with silicone finger prostheses. Psychosocial benefits outweighed functional restoration; evidence drawn from limited case data(26). Joseph AM, *et al.* (2020) Cosmetic glove-like finger prosthesis Glove-like prosthesis design provided improved retention and ease of donning while maintaining high cosmetic acceptability. Patient satisfaction was strong in the short term; long-term durability data remain limited(27). Carey EJ, *et al.* (2020) Systematic Review of QOL in Upper Limb Amputees Showed prosthetic rehabilitation improved quality of life, though heterogeneity of studies limited conclusions. Limitations include cost, durability, and technical demands. Psychosocial impact strongest(28). Dias Caldeira FI, *et al.* (2021) Integrative Review of Silicone Prostheses. Review concluded silicone prostheses remain gold standard for cosmetic finger replacement due to realism and acceptance(29). Bregoli C, *et al.* (2022) Osseo integrated implants review. Reviewed literature supports osseointegration as promising for stability and function in finger amputees. Surgical risks, infection potential, and cost remain barriers (30). Bashir T, *et al.* (2022). Innovative Forefinger Prosthesis Technique Reported a novel fabrication technique for forefinger prosthesis that achieved improved fit and lifelike appearance. Evidence limited to case experience; broader validation needed (31). Arias DG, *et al.* (2023) NIH Hand Anatomy Resource, Educational review of hand anatomy essential for prosthetic design. Serves as reference framework (32). Vijayan A, *et al.* (2023) 3D-printed personalized prostheses, early clinical efficacy investigates the early clinical efficacy of 3D-printed personalized prostheses (33). Srija Vennam, Vijayas, *et al.* (2024) 3D printed prosthetic and orthotic devices, reported patient outcomes, satisfaction, assesses patient outcomes and satisfaction with 3D printed prosthetic and orthotic devices (34). Kumar A, *et al.* (2024) Prosthetic finger fabrication approaches comparing clinical rest position (CRP) and palms fingers extended (PFE) postures, authors highlighted biomechanical and cosmetic tradeoffs in fabrication. Both methods restore cosmesis, CRP may optimize functional alignment (35). Sankar *et al.*, 2025 A natural biomimetic prosthetic hand with neuromorphic tactile sensing for precise and compliant grasping (36). Natural biomimetic prosthetic hand texture and object identification demonstrates high

accuracy in texture and object identification. The systematic review demonstrates the effectiveness of finger prosthetics in improving aesthetic outcomes, functional outcomes, patient satisfaction, and quality of life. The studies highlight the importance of advancements in prosthetic technology, including the use of silicone biomaterial and bio inspired embedded touch feedback. Future studies should focus on larger sample sizes, longer follow-up periods, and reducing biases.

Aesthetic Outcomes: The studies included in the review demonstrate that finger prosthetics can improve aesthetic outcomes, including patient satisfaction and cosmetic appearance (2). The use of silicone biomaterial and other materials can improve the aesthetic outcomes of finger prosthetics (8,14). Aesthetic outcomes are crucial for patient satisfaction and overall quality of life (11).

Functional Outcomes: The studies show that finger prosthetics can improve functional outcomes, including hand function and grip power (12,24). The use of bio inspired embedded touch feedback can enhance the functional outcomes of finger prosthetics (14). Functional outcomes are essential for patients to perform daily activities and maintain independence (26).

Patient Satisfaction: The studies demonstrate that finger prosthetics can improve patient satisfaction, including satisfaction with aesthetic appearance and functional outcomes (11,12). The use of patient-centered approaches can increase patient satisfaction with finger prosthetics (13, 14). Patient satisfaction is a critical aspect of healthcare, and finger prosthetics can significantly impact patient satisfaction(30).

Quality of Life: The studies highlight the importance of finger prosthetics in improving the quality of life of individuals with finger amputations (16,17). The use of finger prosthetics can improve the overall quality of life of individuals with finger amputations (18,19). Quality of life is a critical aspect of healthcare, and finger prosthetics can significantly impact quality of life (23).

Advancements in Prosthetic Technology:The studies demonstrate the advancements in prosthetic technology, including the use of silicone biomaterial and bio inspired embedded touch feedback(4,6). The studies highlight the potential for future advancements in prosthetic technology, including the use of artificial intelligence and machine learning (23,24). Advancements in prosthetic technology can significantly impact the lives of individuals with finger amputations (25). The studies have some limitations, including small sample sizes (26,27)and limited follow up periods (28,29). Additionally, the studies may have biases, including selection bias (30,31) and publication bias (23).

The body of literature on silicone and cosmetic finger prostheses is dominated by case reports, small case series, technical notes, and several observational studies and reviews examining functional and psychosocial outcomes. Collectively, these works emphasize that modern silicone prostheses reliably improve cosmetic appearance and psychosocial well-being, while questions remain about objective functional gains, optimal retention/suspension methods, long-term durability, and comparative effectiveness of advanced approaches such as Osseo integration and sensory-enabled prostheses (1–9, 12–14, 21–29). Below we synthesize findings by theme.

Fabrication techniques and clinical feasibility: -Multiple authors describe practical, reproducible fabrication workflows for silicone finger prostheses. Joseph *et al.* presented a “cosmetic glove-like” approach designed for improved coverage and color match. Shanmuganathan *et al.* and Raghu *et al.* describe conventional aesthetic silicone prostheses with stepwise moulding and intrinsic/extrinsic pigmentation to restore natural appearance (8,14). Several case reports and technique papers (Bashir, Saxena, and others) emphasize simplified, cost-sensitive methods that can be applied in low-resource settings (17,21). Kumar *et al.*'s review comparing clinical rest position (CRP) versus palms-and-fingers-extended (PFE) approaches highlights that small modifications in

moulding posture materially affect digit resting posture and perceived naturalness (33). Overall, the literature shows robust technical feasibility silicone prostheses are reproducible, customizable, and adaptable to different clinical contexts (4, 8, 12).

Suspension and retention strategies: -Retention remains a recurring technical challenge. Arazpour and colleagues described a novel suspension method and evaluated its impact on retention and patient satisfaction, reporting improved retention and quality of life relative to conventional approaches (11,12). Other case reports discuss self-suspension techniques for ear/finger prostheses and show feasibility but limited generalizability (14). The comparative data are sparse and mainly nonrandomized; nevertheless, improved mechanical retention is consistently associated with higher daily wear time and patient satisfaction in observational work (11,12,17,24). For clinicians, this underscores the importance of tailoring suspension (anatomic undercuts, adhesives, finger sleeves, or Osseo integration where appropriate) to the residual limb anatomy and patient needs.

Materials, color matching, and aesthetics: -Silicone remains the dominant material due to its flexibility, durability, and capacity for realistic pigmentation. Colorimetric analyses (Bicchierini *et al.*) reveal variability in shade matching and emphasize the need for systematic shade-matching protocols and standardized pigments to improve realism (5). Case series and case reports consistently report high patient satisfaction with cosmetic outcomes when intrinsic and extrinsic coloration and nail replication are applied carefully (2,4,5). The literature also shows that small differences in texturing and translucency materially affect perceived realism, which in turn influences psychosocial acceptance (34,36).

Functional outcomes and objective measures: -Evidence for objective functional improvement (grip strength, dexterity, ADL performance) is mixed but promising. Kuret *et al.* and Nayak *et al.* report improvements in grip power, grip-force tracking, and ADL performance following prosthetic rehabilitation with silicone digits (13,26). However, these studies tend to be small and observational; randomized data are absent. Reviews and systematic syntheses of upper-limb prosthetic outcomes highlight that functional benefits vary widely with prosthesis type (cosmetic vs. body-powered vs. myoelectric) and that users often prioritize different outcomes (cosmesis vs. function) (23,26,29). In short, cosmetic silicone fingers primarily restore appearance and passive function (improved bimanual tasks, stabilization), with modest and variable gains in active force/precision tasks (35).

Psychosocial impact and quality of life: -A consistent finding across case reports, observational studies, and integrative reviews is the positive psychosocial effect of realistic finger prostheses: improved self-image, social confidence, and reduction in stigmatization (2,4,8,12,16). Arazpour *et al.* explicitly measured quality of life improvements associated with better retention (11). Systematic reviews of prosthetic rehabilitation concur that prostheses when acceptable in appearance and comfort produce meaningful QOL benefits for many users (26). Importantly, psychosocial outcomes depend not just on prosthesis appearance but on wearability, comfort, and the interpersonal context of the patient.

Emerging technologies

Osseo integration and sensory feedback: -Two important frontiers are Osseo integrated implants and sensory enabled prosthetic digits. Reviews on Osseo integration (Bregoli *et al.*) suggest that percutaneous metallic implants provide superior mechanical fixation and potentially better force transmission and prosthesis control, but they carry infection and implant failure risks that necessitate careful patient selection and long term follow up (30). Barone *et al.* described a cosmetic digit with embedded bioinspired tactile feedback that can convey touch sensations a promising step toward prostheses that combine aesthetics with sensory function (24). These approaches show great potential but currently are limited by small sample sizes, technical complexity, and limited long-term outcome data.

Surgical and anatomical considerations: -Foundational anatomical and surgical literature (Taylor & Schwarz; Jones *et al.*; Smock *et al.*) provides important context for prosthetic planning: residual limb contour, scar placement, joint stiffness, and neuroma status all affect prosthesis fit and prognosis (1,6,23). Surgical techniques that preserve length and create favorable contours simplify prosthetic rehabilitation and improve outcomes.

Methodological quality and limitations of the evidence: -The evidence base is heterogeneous and dominated by case reports, small series, lab prototypes, and observational studies. High-quality randomized trials are absent, and many empirical studies have small samples, limited follow-up, and risk of confounding or selective reporting (1,9,11). Systematic reviews summarized in the list note variable methodology across primary studies and recommend better standardization of outcomes (objective functional tests, validated QOL/instrumented measures) and longer follow-up (23,26,29).

Gaps and priorities for future research: -Comparative effectiveness trials comparing suspension techniques (adhesive vs. anatomic vs. Osseo integrated) and prosthesis types (plain silicone vs. sensory-enabled) are needed to quantify benefits and harms. Standardized outcome sets adoption of a core outcome set (objective function, wear time, patient-reported cosmesis, QOL, complication rates) would facilitate pooling. Long-term durability and cost-effectiveness studies, especially in low-resource settings, to inform scalable programs. Larger feasibility studies of sensory feedback and Osseo integration that include infection/complication surveillance and patient-centered endpoints. Colorimetric and materials research to improve shade matching and reduce need for frequent refabrication (5).

Clinical implications: -Based on the synthesized literature, clinicians should:

- Prioritize realistic silicone prostheses for patients whose primary concern is cosmesis and psychosocial reintegration,
- Individualize suspension strategy to the residual anatomy and patient preferences,
- Set realistic expectations about functional gains (modest for active precision tasks), and
- Consider advanced options (Osseo integration, sensory devices) only after discussing risks, benefits, and the uncertain long-term data (7, 9, 12, 21,29).

CONCLUSION

This systematic review synthesizing 24 studies on finger prostheses highlights both the progress achieved and the persistent limitations in this field. The evidence consistently demonstrates that silicone and glove-like prostheses remain the most widely accepted approaches, primarily for their superior cosmetic outcomes and ability to restore patient confidence and social reintegration. Suspension systems and improved pigmentation techniques further enhance user satisfaction by improving retention, stability, and lifelike appearance. Case reports and small cohort studies indicate clear psychosocial benefits, particularly in alleviating stigma and improving quality of life, even though functional restoration remains modest. At the same time, several gaps are evident. Functional performance especially fine motor skills and tactile feedback continues to lag behind cosmetic achievements. Innovations such as Osseo integrated implants, bio inspired sensors, and novel suspension designs show promise but remain largely experimental, with limited long-term outcome data. The review also revealed significant methodological shortcomings, including reliance on case reports, heterogeneity in outcome measures, and lack of standardized patient-reported outcomes. These limitations restrict the generalizability of findings and hinder robust comparisons across studies. In summary, while current prosthetic designs reliably meet patients' cosmetic expectations, the challenge of achieving functional parity with the natural finger remains unmet. Future research must prioritize standardized evaluation tools, larger multicenter studies, and the integration of emerging technologies to

balance aesthetics with functional performance. Such an approach will not only improve clinical outcomes but also address the high rates of prosthesis abandonment documented in broader upper limb literature. Advancing finger prosthetic design from primarily cosmetic devices toward functionally integrated solutions represents the critical next step in rehabilitation science. From a clinical perspective, the findings of this review reaffirm that finger prostheses provide significant psychosocial benefits, particularly by improving self-esteem, social acceptance, and reintegration into daily life. For many patients, cosmesis and body image restoration remain the primary motivators for prosthetic use, underscoring the importance of precise color matching, natural surface texturing, and stable suspension techniques. Clinicians should therefore prioritize patient-centered aesthetic outcomes while also addressing basic functional needs, such as improved grip assistance and protection of sensitive amputation sites. Early counseling and expectation management remain critical to reducing prosthesis abandonment.

Future research should aim to bridge the gap between cosmetic satisfaction and functional restoration. Promising directions include the integration of Osseo integrated implants for improved stability, bio inspired tactile sensors for enhanced feedback, and lighter, more durable materials that mimic natural skin tone and elasticity. Rigorous comparative trials and standardized outcome measures including patient-reported quality of life, functional dexterity, and prosthesis usage patterns are essential for generating evidence that can guide both clinical practice and device development. Additionally, cost-effective fabrication methods must be explored to ensure accessibility in low-resource settings, where prosthetic provision is still limited. Collaborative efforts between prosthodontics, engineers, material scientists, and rehabilitation specialists will be key to advancing finger prosthesis design. By combining aesthetic refinements with functional innovation, future prostheses may evolve from passive cosmetic devices into integrated rehabilitation tools, improving not only appearance but also meaningful hand use in activities of daily living. Studies of silicone and glove-like prostheses dominate current practice, demonstrating strong cosmetic and psychosocial benefits but limited functional restoration. Suspension systems, pigmentation, and digital fabrication remain focal areas for improvement. Broader prosthetic research confirms persistent challenges in user satisfaction and device abandonment, emphasizing the necessity for rigorous, standardized, patient-centered studies to guide future innovation.

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