Persistent Chemotherapy-Induced Alopecia: A Scoping Review

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Introduction

Persistent chemotherapy-induced alopecia (pCIA) is defined as incomplete hair growth occurring **6 months or more** after chemotherapy (Freites-Martinez et al., 2019). This scoping review aims to identify gaps for future research by mapping the **causative agents, presentation, impacts on quality of life (QoL) and management** of pCIA from the literature.

Methods

This review was prepared following PRISMA guidelines. Embase, MEDLINE, CINAHL and Web of Science were searched from 1910, 1946, 1937 and 1900 respectively to March 2024. **Primary human studies in English** that address the above aspects of pCIA were included.

Results

Thirty-five articles were included.

Table 1: Characteristics of articles included

	No. of studies n (%)
Year of publication	
2020 or after	11 (31.4%)
2010-2019	18 (51.4%)
2000-2009	6 (17.1%)
Country of study	
The United States	7 (20%)
Europe	8 (22.9%)
Asia Pacific	10 (28.6%)
Others	10 (28.6%)
Type of study	
Randomised controlled trial	1 (2.9%)
Prospective study	7 (20%)
Retrospective cohort study	6 (17.1%)
Cross-sectional study	4 (11.4%)
Case series	5 (14.3%)
Case report	11 (31.4%)
Qualitative study	1 (2.9%)
Age group	
Paediatric patients only	1 (2.9%)
Adult patients only	31 (88.6%)
Both paediatric and adult patients	3 (8.6%)
Tumour type	
Breast cancer	26 (74.3%)
Other solid tumours	6 (17.1%)
Haematological malignancies	11 (31.4%)
Type of chemotherapy	
Taxane	22 (62.9%)
Anthracycline	16 (45.7%)
Alkylating agent	27 (77.1%)
Topoisomerase inhibitor	6 (17.1%)
Vinca alkaloid	4 (11.4%)
Anti-metabolite	13 (37.1%)
Not specified	3 (8.6%)

Incidence and Causative Agents

- Most studies (26/35, 74%) reported pCIA in **breast cancer** patients.
- **Taxane, anthracycline and alkylating agent** chemotherapy were most frequently reported to be associated with pCIA.

Conclusions

- **The incidence and risk factors of pCIA need to be prospectively evaluated across different cancer types and chemotherapeutic agents.**
- **In view of the significant negative impacts on patients' QoL, more randomised controlled trials should be performed to study existing and emerging interventions for the management of pCIA.**

Scan for the full list of included articles

Reference

Freites-Martinez A, Shapiro J, van den Hurk C, Goldfarb S, Jimenez JJ, Rossi AM, Paus R, Lacouture ME. Hair disorders in cancer survivors. J Am Acad Dermatol. 2019 May;80(5):1199-1213. doi: 10.1016/j.jaad.2018.03.056. Epub 2018 Apr 14. PMID: 29660423; PMCID: PMC6186205.

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Results

Presentation

Table 2: Pathological features in patients experiencing pCIA

Pathological feature	No. of studies/ No. of total studies reporting on pathology (%)
Non-scarring alopecia with minimal inflammation or fibrosis	17/18 (94.4%)
Reduction in large hair follicles	12/18 (66.7%)
Increase in small vellus like hairs i.e. miniaturization	9/18 (50%)
Increase in telogen	6/18 (33.3%)
Reduction in anagen follicles	2/18 (11.1%)

Table 3: Clinical features in patients experiencing pCIA

Clinical feature	No. of studies/ No. of total studies reporting on clinical presentation (%)
Concomitant eyebrow, eyelash or body hair involvement	12/28 (42.9%)
No concomitant eyebrow, eyelash or body hair involvement	3/28 (10.7%)
Changes in hair characteristics including colour, texture or strength or length	5/28 (17.9%)
Androgenetic alopecia	13/18 (72.2%)
Diffuse alopecia	11/28 (39.3%)
Patchy alopecia	4/28 (14.3%)

Quality of life (QOL)

- All six studies that measured QoL reported that pCIA had **negative impacts** on patients' QoL.
- There **is no consistent QoL tool** for measuring pCIA QoL impacts.
- QoL impacts reported included negative **psychological impacts** and **impacts on interactions with others.**

Interventions

Twenty studies reported on interventions for the management of pCIA, with the most common study type being case reports (8/20, 40%).

Prevention

- **Scalp cooling** was the only intervention shown to prevent pCIA based on two prospective trials and a retrospective study.
  - In terms of safety, no scalp relapses were observed, neither isolated nor in association with other metastatic sites, but **cold thermal injury** has been reported in a retrospective study.

Management

- **Topical minoxidil** (2% or 5%):

Table 4: Summary of studies on topical minoxidil for managing pCIA

Type of studies	No. of studies/ No. of total studies on topical minoxidil (%)
Effective	
Retrospective studies	6/10 (60%)
Ineffective	
Retrospective studies	4/10 (40%)
Prospective studies	2/2 (100%)

- **Low dose oral minoxidil** (LDOM) (0.5-2.5mg) showed efficacy in all 4 retrospective studies.
  - Adverse effects reported included hypertrichosis and cardiological side effects.
- Other management strategies included:
  - **Oral anti-androgen** - reported to be effective in a retrospective case series but ineffective in a prospective study.
  - **CG428** - reported to show improvement but not being statistically significant in a pilot randomized double-blind controlled clinical trial.
  - **Extracellular enriched vesicles (EVs)** derived from human placental mesenchymal stromal cells (MSCs) - reported to be effective in a case report.
  - **QR678® solution** (composed of a mixture of growth factors) - reported to be effective in a prospective pilot study.