

Supplementary Materials

Platelet-Rich Plasma in the Management of Alopecia: A Systematic Review and Meta-Analysis of Clinical Evidence

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Systematic search strategy

PUBMED

(
"Alopecia"[MeSH Terms] OR "Diffuse Alopecia"[MeSH Terms] OR
"androgenetic alopecia" OR AGA OR FAGA OR
"alopecia areata" OR AA OR
"alopecia totalis" OR
"traction alopecia" OR
"scarring alopecia" OR
"nonscarring alopecia" OR
"non-scarring alopecia" OR
"cicatricial alopecia" OR CA OR
"primary cicatricial alopecia" OR PCA OR
"secondary cicatricial alopecia" OR SCA OR
"noncicatricial alopecia" OR NCA OR
"non-cicatricial alopecia" OR
"frontal fibrosing alopecia" OR FFA OR
"fibrosing alopecia" OR
"alopecia mucinosa" OR
"telogen effluvium" OR
"anagen effluvium" OR
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"diffuse hair loss" OR
"hair loss" OR
"loss of hair" OR
baldness OR
"lichen planopilaris" OR LPP OR
folliculitis OR
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"erosive pustular dermatosis" OR

"Graham Little Syndrome" OR

"classic pseudopelade" OR

"central centrifugal cicatricial alopecia" OR CCCA OR

"chemotherapy-induced alopecia" OR

"discoid lupus erythematosus" OR

"chronic cutaneous lupus erythematosus"

)

AND

(

"Platelet-Rich Plasma"[MeSH Terms] OR

PRP OR

"platelet rich plasma" OR

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"P-PRP gel" OR

"L-PRP gel" OR

PRP-GM

)

EMBASE

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SCOPUS

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INDEXTERMS(Alopecia) OR INDEXTERMS("Diffuse Alopecia") OR

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"PRP gel" OR

"P-PRP gel" OR

"L-PRP gel" OR

PRP-GM

)

Diagnostic plots, regression tests, meta-analyses and meta-regressions of primary and secondary outcomes

Hair density

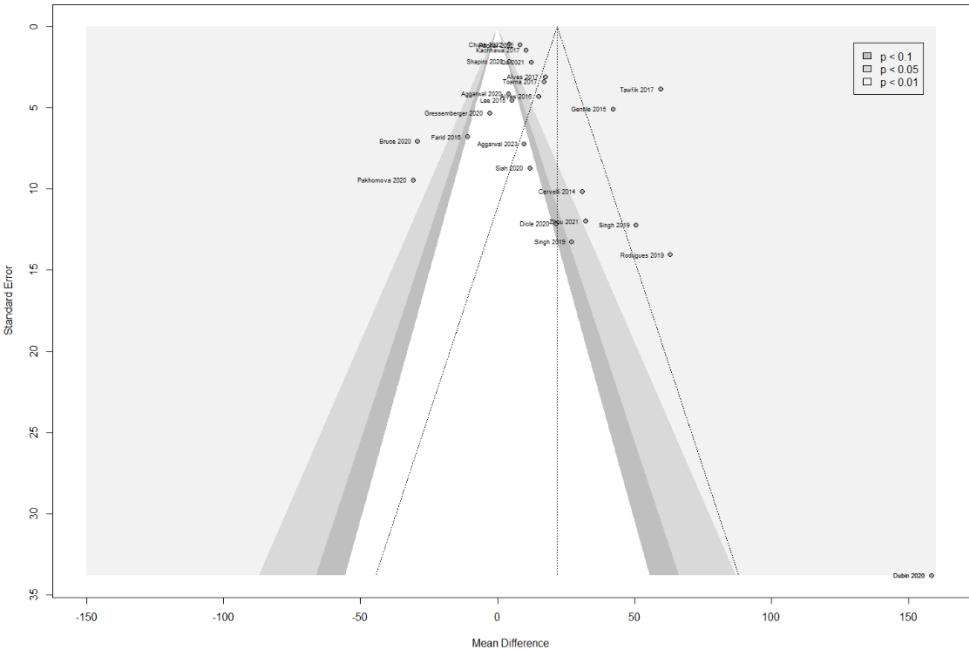


Figure S1. Contour enhanced funnel plot for trials of the effect of PRP on hair density: The vertical line represents the pooled effect estimate. Contour lines indicate regions of statistical significance ($p < 0.01$, $p < 0.05$, and $p < 0.10$). Asymmetry in the distribution of studies may suggest potential publication bias or small-study effects.

```
Eggers' test of the intercept
=====
intercept    95% CI    t      p
2.035 -0.09 - 4.16 1.878 0.07255516
Eggers' test does not indicate the presence of funnel plot asymmetry.
```

Figure S2. Results of Egger's test for funnel plot asymmetry (Figure S1). No statistically significant intercept was found ($p > 0.05$), suggesting no evidence of asymmetry or publication bias.

Hair thickness

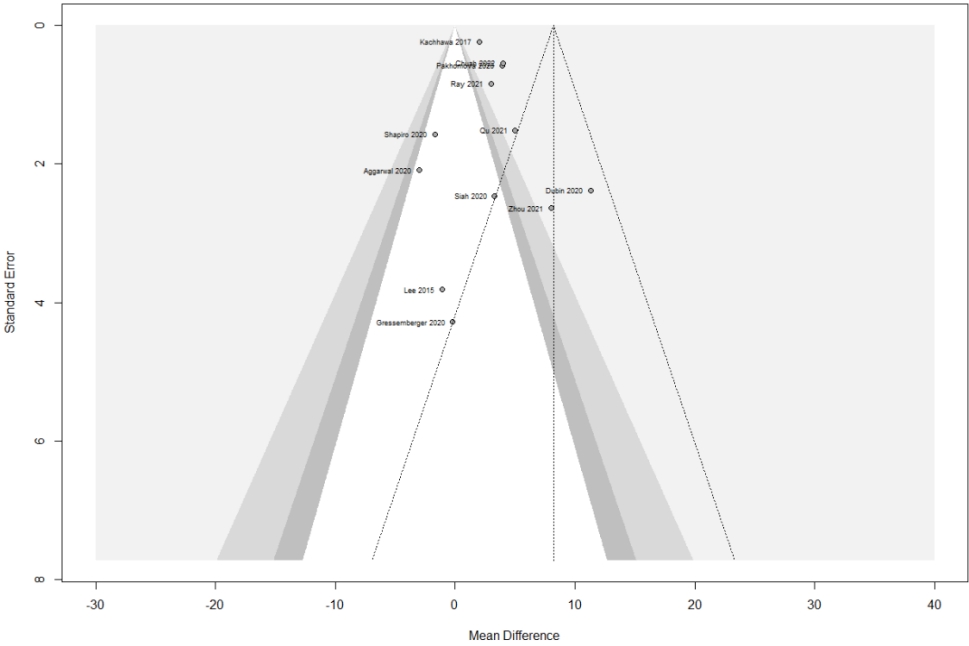


Figure S3. Contour enhanced funnel plot for trials of the effect of PRP on hair thickness: The vertical line represents the pooled effect estimate. Contour lines indicate regions of statistical significance ($p<0.01$, $p<0.05$, and $p<0.10$). Asymmetry in the distribution of studies may suggest potential publication bias or small-study effects.

```
Eggers' test of the intercept
=====
intercept    95% CI    t      p
1.862 -0.64 - 4.37 1.457 0.1729727
Eggers' test does not indicate the presence of funnel plot asymmetry.
```

Figure S4. Results of Egger’s test for funnel plot asymmetry (Figure S3). No statistically significant intercept was found ($p>0.05$), suggesting no evidence of asymmetry or publication bias.

SALT score

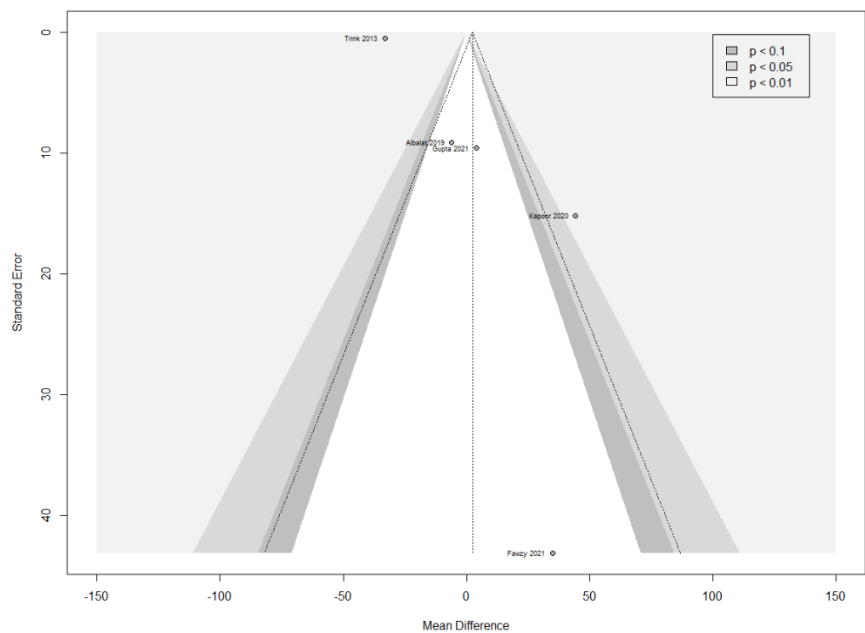


Figure S5. Contour enhanced funnel plot for trials of the effect of PRP on SALT score. The vertical line represents the pooled effect estimate. Contour lines indicate regions of statistical significance ($p < 0.01$, $p < 0.05$, and $p < 0.10$). Asymmetry in the distribution of studies may suggest potential publication bias or small-study effects.

```
Eggers' test of the intercept
=====
intercept      95% CI      t      p
      3.491  1.95 - 5.03  4.436  0.02129293
Eggers' test indicates the presence of funnel plot asymmetry.
```

Figure S6. Results of Egger's test for funnel plot asymmetry (Figure S5). A statistically significant intercept was found ($p < 0.05$), indicating evidence of asymmetry, which may be consistent with publication bias or small-study effects.

Terminal hair density

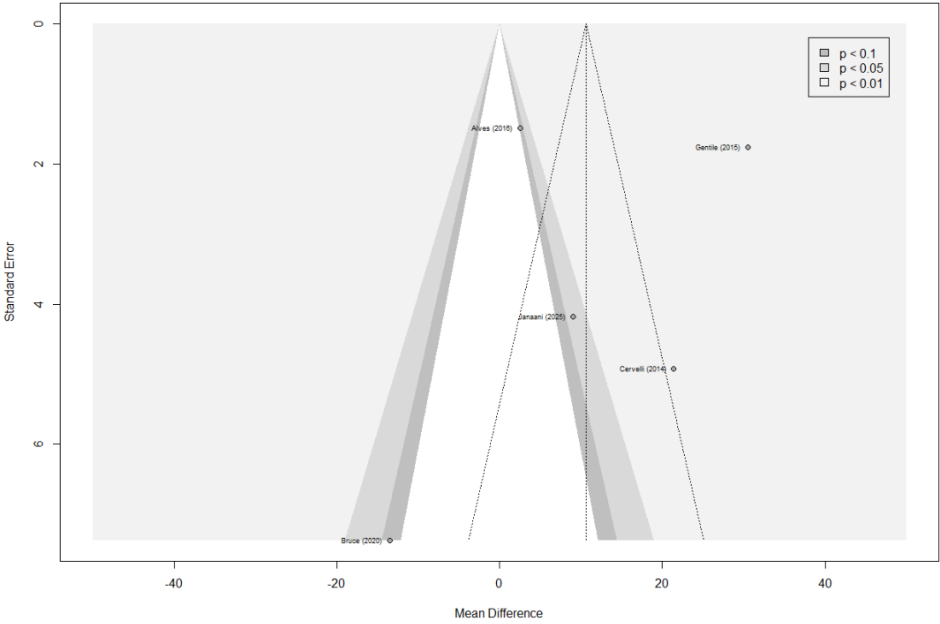


Figure S7. Contour enhanced funnel plot for trials of the effect of PRP on terminal hair density. The vertical line represents the pooled effect estimate. Contour lines indicate regions of statistical significance ($p < 0.01$, $p < 0.05$, and $p < 0.10$). Asymmetry in the distribution of studies may suggest potential publication bias or small-study effects.

```
Eggers' test of the intercept
=====
intercept    95% CI      t      p
      -0.769 -13.53 - 12 -0.118 0.9134426
Eggers' test does not indicate the presence of funnel plot asymmetry.
```

Figure S8. Results of Egger's test for funnel plot asymmetry (Figure S7). No statistically significant intercept was found ($p > 0.05$), suggesting no evidence of asymmetry or publication bias.

Vellus hair density

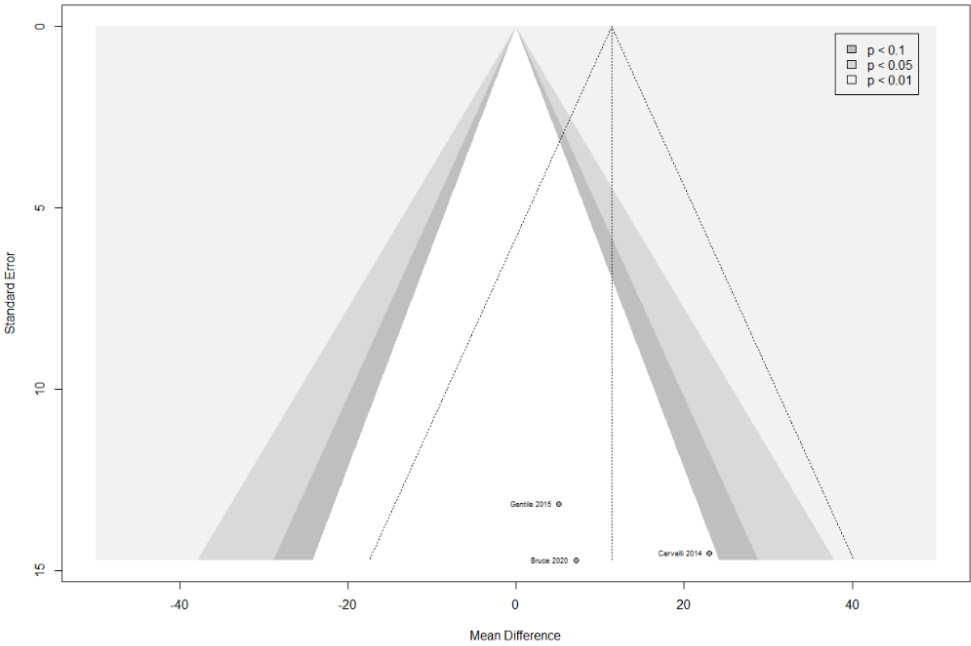


Figure S9. Contour enhanced funnel plot for trials of the effect of PRP on vellus hair density. The vertical line represents the pooled effect estimate. Contour lines indicate regions of statistical significance ($p<0.01$, $p<0.05$, and $p<0.10$). Asymmetry in the distribution of studies may suggest potential publication bias or small-study effects.

```
Eggers' test of the intercept
=====
intercept      95% CI      t      p
      5.907 -12.73 - 24.54 0.621 0.6460471
Eggers' test does not indicate the presence of funnel plot asymmetry.
```

Figure S10. Results of Egger’s test for funnel plot asymmetry (Figure S9). No statistically significant intercept was found ($p>0.05$), suggesting no evidence of asymmetry or publication bias.

Anagen hair

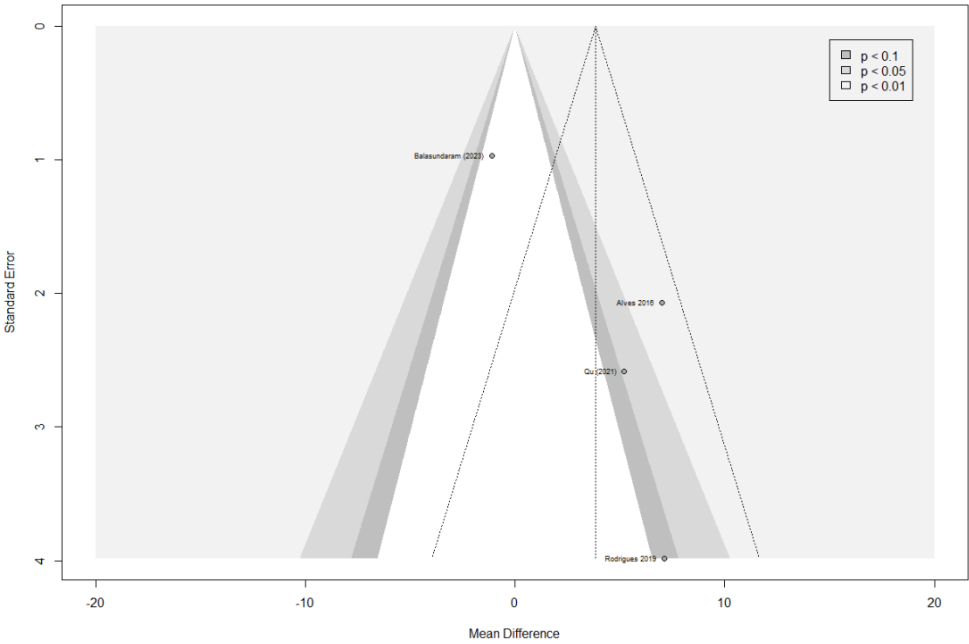


Figure S11. Contour enhanced funnel plot for trials of the effect of PRP on anagen hair. The vertical line represents the pooled effect estimate. Contour lines indicate regions of statistical significance ($p<0.01$, $p<0.05$, and $p<0.10$). Asymmetry in the distribution of studies may suggest potential publication bias or small-study effects.

```
Eggers' test of the intercept
=====
intercept      95% CI      t      p
      3.898  1.08 - 6.72  2.708  0.1136009
Eggers' test does not indicate the presence of funnel plot asymmetry.
```

Figure S12. Results of Egger’s test for funnel plot asymmetry (Figure S11). No statistically significant intercept was found ($p>0.05$), suggesting no evidence of asymmetry or publication bias.

Telogen hair

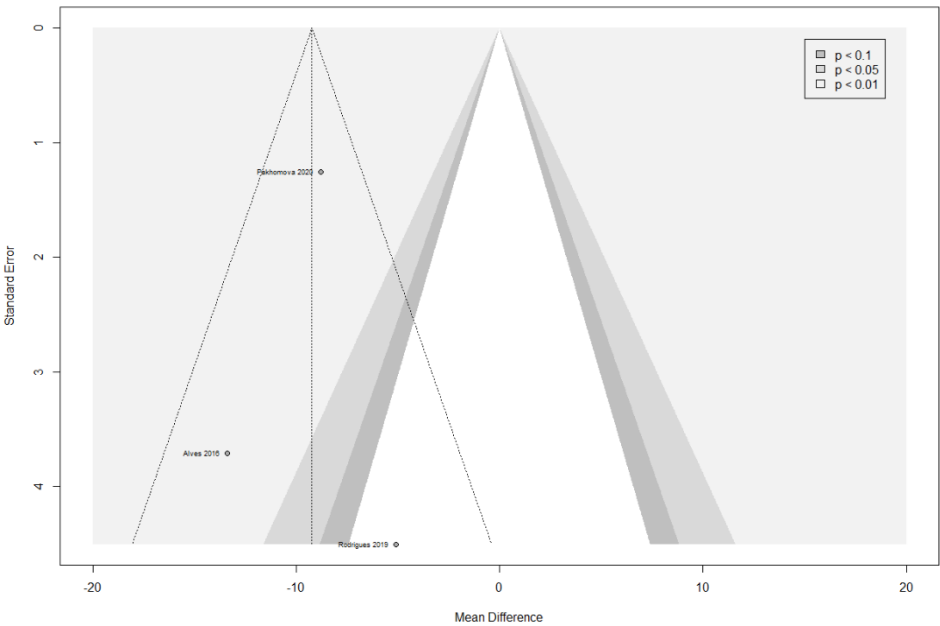


Figure S13. Contour enhanced funnel plot for trials of the effect of PRP on telogen hair. The vertical line represents the pooled effect estimate. Contour lines indicate regions of statistical significance ($p < 0.01$, $p < 0.05$, and $p < 0.10$). Asymmetry in the distribution of studies may suggest potential publication bias or small-study effects.

```
Eggers' test of the intercept
=====
intercept  95% CI    t      p
      -0.198 -3.4 - 3 -0.121 0.9231394
Eggers' test does not indicate the presence of funnel plot asymmetry.
```

Figure S14. Results of Egger's test for funnel plot asymmetry (Figure S13). No statistically significant intercept was found ($p > 0.05$), suggesting no evidence of asymmetry or publication bias.

Adverse effects

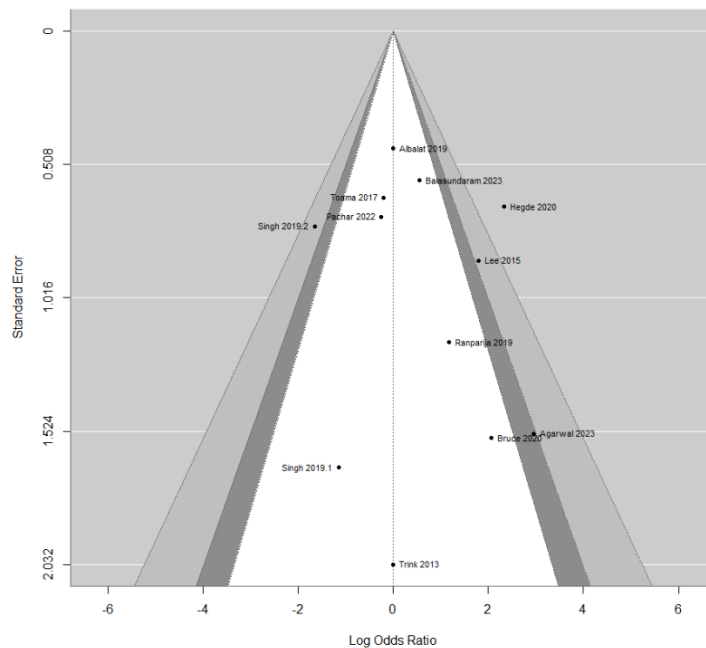


Figure S15. Contour enhanced funnel plot for trials of the effect of PRP on adverse effects. The vertical line represents the pooled effect estimate. Contour lines indicate regions of statistical significance ($p < 0.01$, $p < 0.05$, and $p < 0.10$). Asymmetry in the distribution of studies may suggest potential publication bias or small-study effects.

```
Regression Test for Funnel Plot Asymmetry

Model:      mixed-effects meta-regression model
Predictor:  standard error

Test for Funnel Plot Asymmetry: z =  0.6902, p = 0.4901
Limit Estimate (as sei -> 0):  b = -0.0524 (CI: -1.8796, 1.7748)
```

Figure S16. Results of Egger's test for funnel plot asymmetry (Figure S15). No statistically significant intercept was found ($p > 0.05$), suggesting no evidence of asymmetry or publication bias.

Clinical improvement

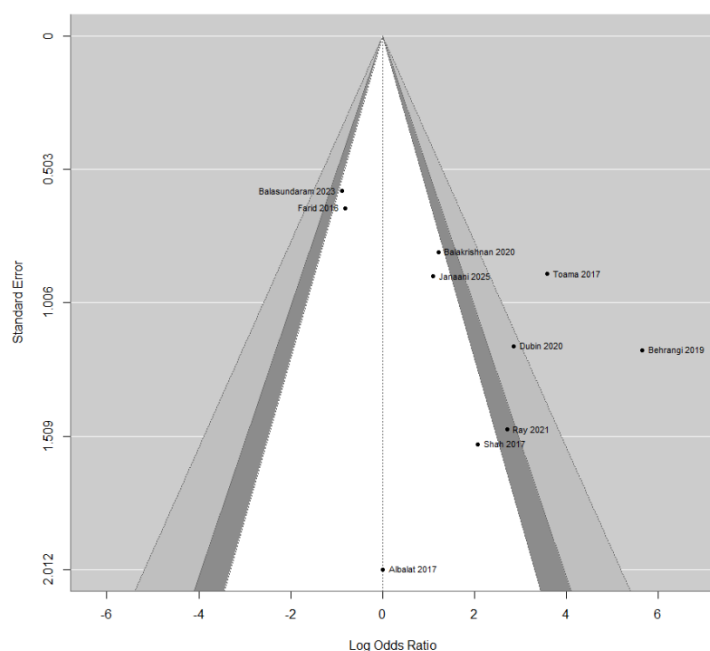


Figure S17. Contour enhanced funnel plot for trials of the effect of PRP on clinical improvement. The vertical line represents the pooled effect estimate. Contour lines indicate regions of statistical significance ($p < 0.01$, $p < 0.05$, and $p < 0.10$). Asymmetry in the distribution of studies may suggest potential publication bias or small-study effects.

Regression Test for Funnel Plot Asymmetry

Model: mixed-effects meta-regression model
Predictor: standard error

Test for Funnel Plot Asymmetry: $z = 1.1436$, $p = 0.2528$
Limit Estimate (as $se_i \rightarrow 0$): $b = -0.3183$ (CI: $-3.9094, 3.2728$)

Figure S18. Results of Egger's test for funnel plot asymmetry (Figure S17). No statistically significant intercept was found ($p > 0.05$), suggesting no evidence of asymmetry or publication bias.

Patients satisfaction

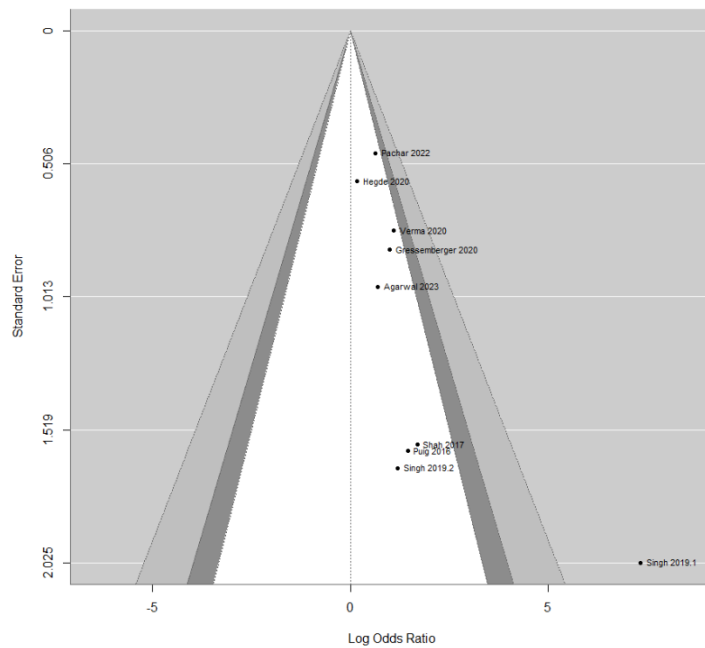


Figure S19. Contour enhanced funnel plot for trials of the effect of PRP on patients satisfaction. The vertical line represents the pooled effect estimate. Contour lines indicate regions of statistical significance ($p<0.01$, $p<0.05$, and $p<0.10$). Asymmetry in the distribution of studies may suggest potential publication bias or small-study effects.

```
Regression Test for Funnel Plot Asymmetry

Model:      mixed-effects meta-regression model
Predictor:  standard error

Test for Funnel Plot Asymmetry: z = 0.1810, p = 0.8564
Limit Estimate (as sei -> 0):  b = 0.5443 (CI: -0.5298, 1.6184)
```

Figure S20. Results of Egger's test for funnel plot asymmetry (Figure S19). A statistically significant intercept was found ($p<0.05$), indicating evidence of asymmetry, which may be consistent with publication bias or small-study effects.

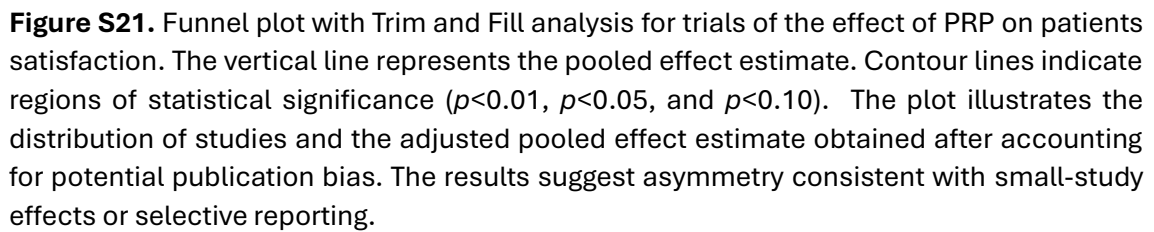


Figure S21. Funnel plot with Trim and Fill analysis for trials of the effect of PRP on patients satisfaction. The vertical line represents the pooled effect estimate. Contour lines indicate regions of statistical significance ($p < 0.01$, $p < 0.05$, and $p < 0.10$). The plot illustrates the distribution of studies and the adjusted pooled effect estimate obtained after accounting for potential publication bias. The results suggest asymmetry consistent with small-study effects or selective reporting.

Recurrence

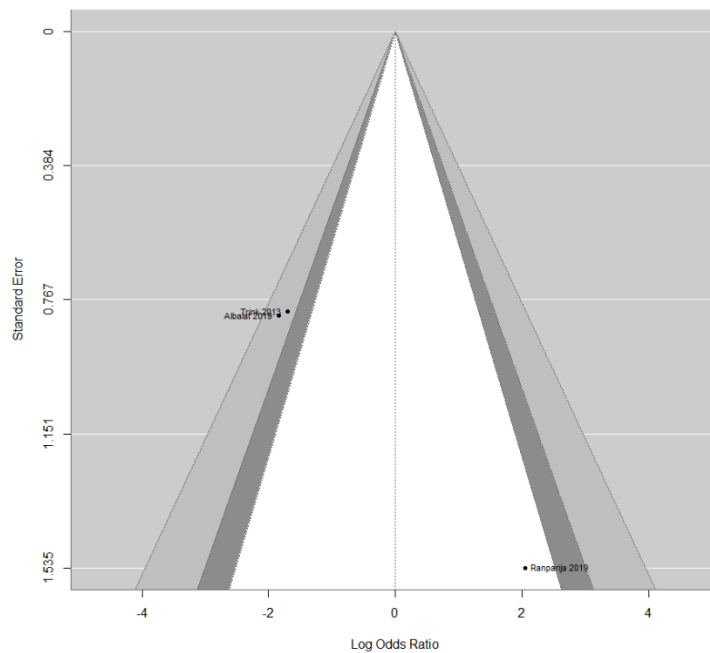


Figure S22. Contour enhanced funnel plot for trials of the effect of PRP on recurrence. The vertical line represents the pooled effect estimate. Contour lines indicate regions of statistical significance ($p < 0.01$, $p < 0.05$, and $p < 0.10$). Asymmetry in the distribution of studies may suggest potential publication bias or small-study effects.

```
Regression Test for Funnel Plot Asymmetry  
Model:      mixed-effects meta-regression model  
Predictor: standard error  
  
Test for Funnel Plot Asymmetry: z = 2.3323, p = 0.0197  
Limit Estimate (as sei -> 0): b = -5.9995 (CI: -10.0769, -1.9222)
```

Figure S23. Results of Egger's test for funnel plot asymmetry (Figure S22). A statistically significant intercept was found ($p < 0.05$), indicating evidence of asymmetry, which may be consistent with publication bias or small-study effects.

Metaregression analysis (primary outcomes)

Hair density

```
Mixed-Effects Model (k = 47; tau^2 estimator: REML)

tau^2 (estimated amount of residual heterogeneity): 381.1793 (SE = 96.3674)
tau (square root of estimated tau^2 value): 19.5238
I^2 (residual heterogeneity / unaccounted variability): 97.73%
H^2 (unaccounted variability / sampling variability): 44.06
R^2 (amount of heterogeneity accounted for): 0.00%

Test for Residual Heterogeneity:
QE(df = 44) = 455.9659, p-val < .0001

Test of Moderators (coefficients 2:3):
QM(df = 2) = 0.7724, p-val = 0.6796

Model Results:

      estimate      se      zval      pval      ci.lb      ci.ub
intprot 29.4752 14.4293  2.0427  0.0411   1.1943  57.7560 *
time    -0.4332  1.5669  -0.2765  0.7822  -3.5042   2.6378
freq    -11.6397 14.5437  -0.8003  0.4235  -40.1448  16.8654

---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Figure S24. Results of the meta-regression analysis of the effect of PRP on hair density including follow-up time and PRP administration as moderator covariates. The output presents the estimated regression coefficients estimates (β), standard errors (SE), 95% confidence intervals (CI), and p-values for each moderator variable. Statistically significant associations ($p < 0.05$) indicate that the moderator contributes to the variability in effect sizes across studies.

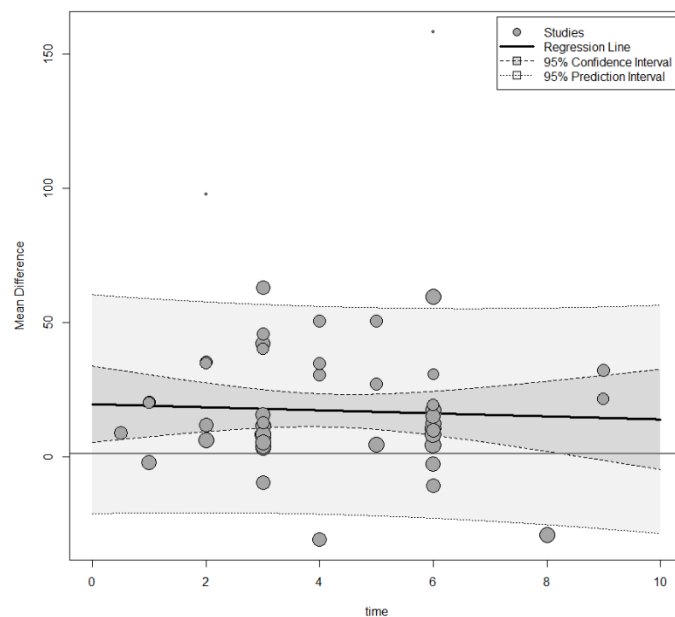


Figure S25. Bubble plot of the meta-regression analysis of the effect of PRP on hair density showing the relationship between follow-up time (months) and the effect size. Each bubble represents a study, with the size of the bubble corresponding to the study's weight. The regression line indicates the estimated association between the moderator and the outcome, with the shaded area representing the 95% confidence interval. Statistically significant results ($p < 0.05$) suggest that the moderator significantly influences the variability in effect sizes across studies.

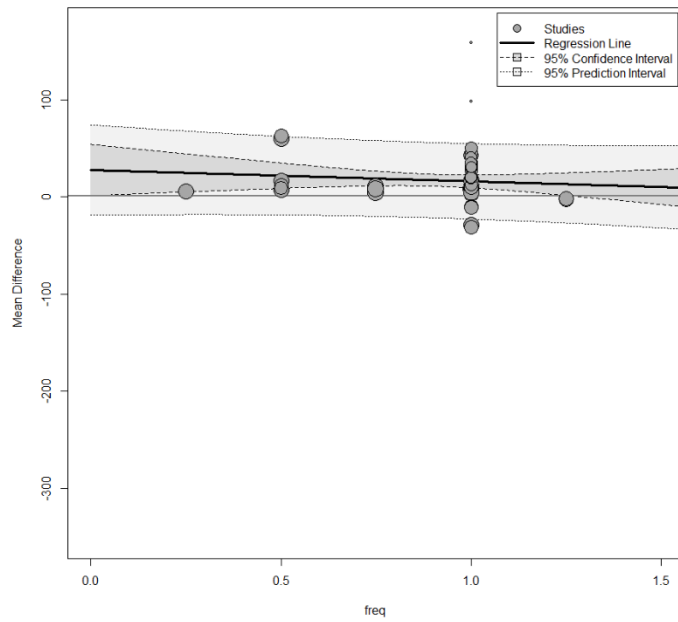


Figure S26. Bubble plot of the meta-regression analysis of the effect of PRP on hair density showing the relationship between PRP administration frequency (time between sessions in months) and the effect size. Each bubble represents a study, with the size of the bubble corresponding to the study's weight. The regression line indicates the estimated association between the moderator and the outcome, with the shaded area representing the 95% confidence interval. Statistically significant results ($p < 0.05$) suggest that the moderator significantly influences the variability in effect sizes across studies.

Hair thickness

```
Mixed-Effects Model (k = 22; tau^2 estimator: REML)

tau^2 (estimated amount of residual heterogeneity): 30.9460 (SE = 12.2277)
tau (square root of estimated tau^2 value): 5.5629
I^2 (residual heterogeneity / unaccounted variability): 95.62%
H^2 (unaccounted variability / sampling variability): 22.81
R^2 (amount of heterogeneity accounted for): 0.00%

Test for Residual Heterogeneity:
QE(df = 19) = 121.4417, p-val < .0001

Test of Moderators (coefficients 2:3):
QM(df = 2) = 4.4138, p-val = 0.1100

Model Results:

      estimate      se      zval      pval      ci.lb      ci.ub
intcpt  4.3594  6.3909   0.6821  0.4952   -8.1666  16.8853
time     1.3640  0.7121   1.9155  0.0554   -0.0317  2.7597
freq     -6.2757  6.2607  -1.0024  0.3162  -18.5464  5.9950

---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Figure S27. Results of the meta-regression analysis of the effect of PRP on hair thickness including follow-up time and PRP administration as moderator covariates. The output presents the estimated regression coefficients estimates (β), standard errors (SE), 95% confidence intervals (CI), and p-values for each moderator variable. Statistically significant associations ($p < 0.05$) indicate that the moderator contributes to the variability in effect sizes across studies.

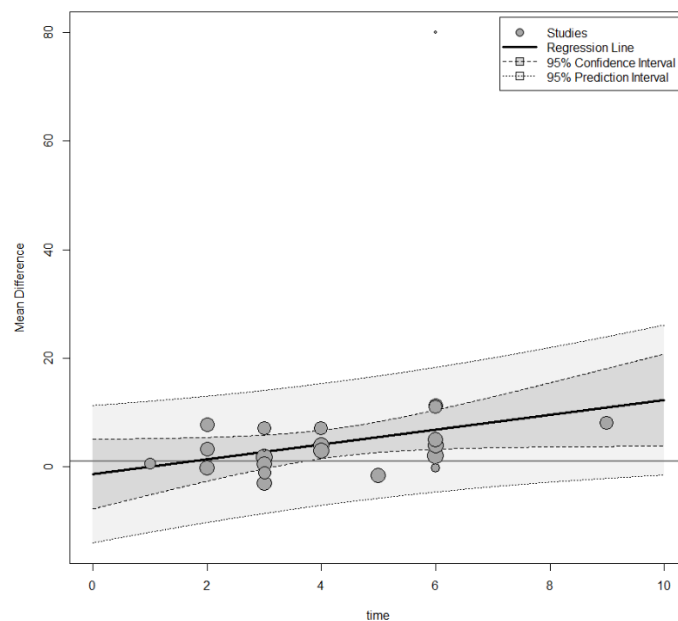


Figure S28. Bubble plot of the meta-regression analysis of the effect of PRP on hair thickness showing the relationship between follow-up time (months) and the effect size. Each bubble represents a study, with the size of the bubble corresponding to the study's weight. The regression line indicates the estimated association between the moderator and the outcome, with the shaded area representing the 95% confidence interval. Statistically significant results ($p < 0.05$) suggest that the moderator significantly influences the variability in effect sizes across studies.

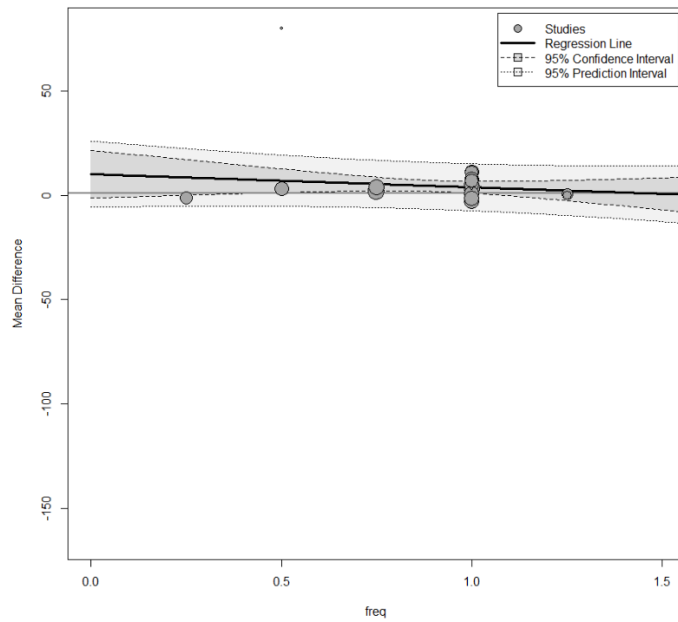
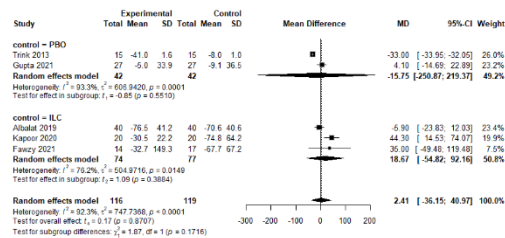


Figure S29. Bubble plot of the meta-regression analysis of the effect of PRP on hair thickness showing the relationship between PRP administration frequency (time between sessions in months) and the effect size. Each bubble represents a study, with the size of the bubble corresponding to the study's weight. The regression line indicates the estimated association between the moderator and the outcome, with the shaded area representing the 95% confidence interval. Statistically significant results ($p < 0.05$) suggest that the moderator significantly influences the variability in effect sizes across studies.

Forest plots (continous data)

SALT score

A)



B)

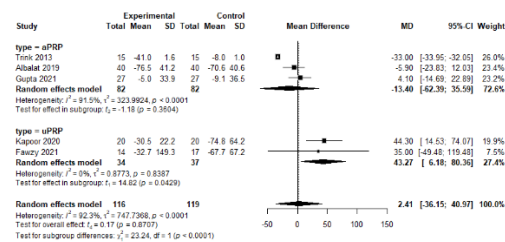
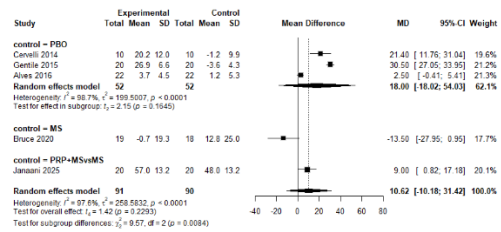


Figure S30. Forest plot of the meta-analysis on the effect of PRP alone or combined with other active substances vs. control on SALT Score (% change from baseline) across: A) different types of control treatment: placebo (PBO), polydeoxyribonucleotide (PDRN) or minoxidil (MS), and B) different states of PRP activation: activated PRP (aPRP) and non-activated PRP (uPRP). Squares represent individual study Mean Difference estimates (MD), with 95% confidence intervals [95% CI]. Square size reflects study weight extracted from random effects meta-analysis ($W[\%]$). The vertical line indicates no effect, and the diamond shows individual subgroup and overall estimates.

Terminal hair density

A)



B)

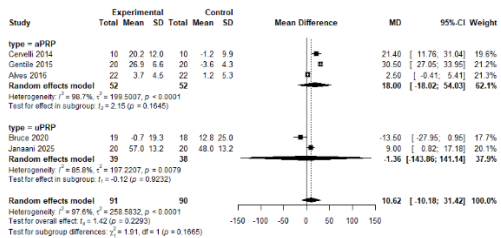
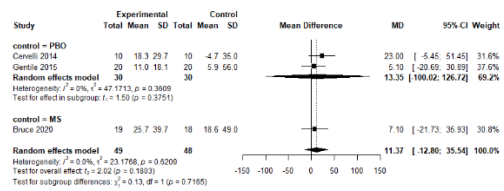


Figure S31. Forest plot of the meta-analysis on the effect of PRP alone or combined with other active substances vs. control on terminal hair density (% change from baseline): A) different types of control treatment: placebo (PBO), polydeoxyribonucleotide (PDRN) or minoxidil (MS), and B) different states of PRP activation: activated PRP (aPRP) and non-activated PRP (uPRP). Squares represent individual study Mean Difference estimates (MD), with 95% confidence intervals [95% CI]. Square size reflects study weight extracted from random effects meta-analysis (W[%]). The vertical line indicates no effect, and the diamond shows individual subgroup and overall estimates.

Vellus hair density

A)



B)

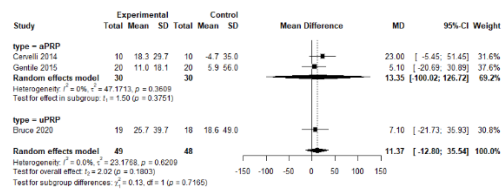
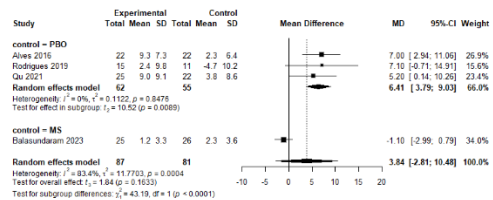


Figure S32. Forest plot of the meta-analysis on the effect of PRP alone or combined with other active substances vs. control on vellus hair density (% change from baseline): A) different types of control treatment: placebo (PBO), polydeoxyribonucleotide (PDRN) or minoxidil (MS), and B) different states of PRP activation: activated PRP (aPRP) and non-activated PRP (uPRP). Squares represent individual study Mean Difference estimates (MD), with 95% confidence intervals [95% CI]. Square size reflects study weight extracted from random effects meta-analysis (W[%]). The vertical line indicates no effect, and the diamond shows individual subgroup and overall estimates.

Anagen hair

A)



B)

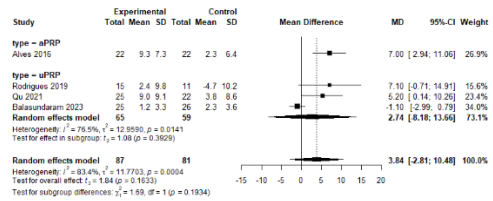
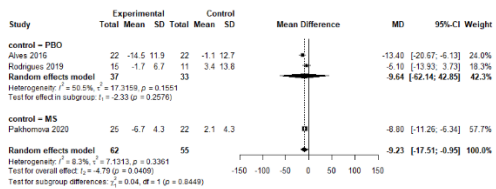


Figure S33. Forest plot of the meta-analysis on the effect of PRP alone or combined with other active substances vs. control on anagen hair (%): A) different types of control treatment: placebo (PBO), polydeoxyribonucleotide (PDRN) or minoxidil (MS), and B) different states of PRP activation: activated PRP (aPRP) and non-activated PRP (uPRP). Squares represent individual study Mean Difference estimates (MD), with 95% confidence intervals [95% CI]. Square size reflects study weight extracted from random effects meta-analysis (W[%]). The vertical line indicates no effect, and the diamond shows individual subgroup and overall estimates.

Telogen hair

A)



B)

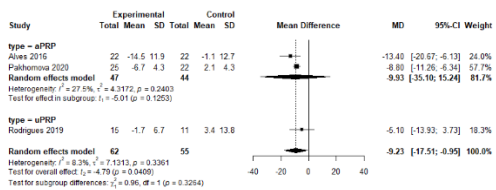
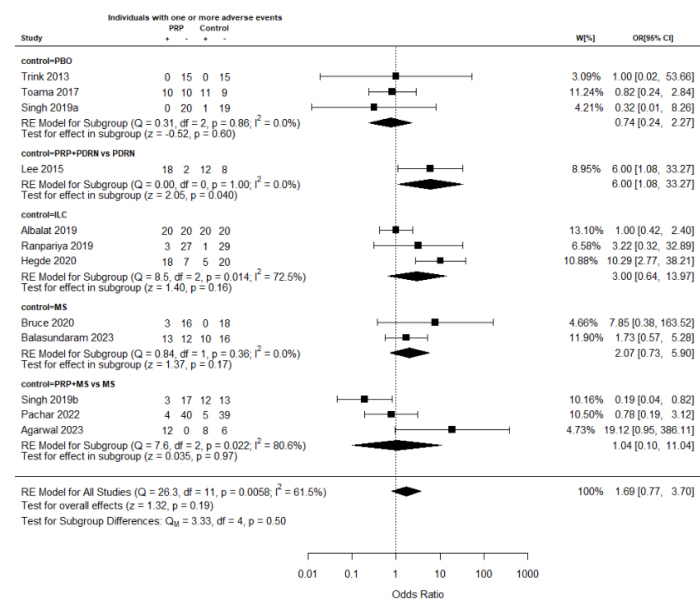


Figure S34. Forest plot of the meta-analysis on the effect of PRP alone or combined with other active substances vs. control on telogen hair (%): A) different types of control treatment: placebo (PBO), polydeoxyribonucleotide (PDRN) or minoxidil (MS), and B) different states of PRP activation: activated PRP (aPRP) and non-activated PRP (uPRP). Squares represent individual study Mean Difference estimates (MD), with 95% confidence intervals [95% CI]. Square size reflects study weight extracted from random effects meta-analysis ($W[\%]$). The vertical line indicates no effect, and the diamond shows individual subgroup and overall estimates.

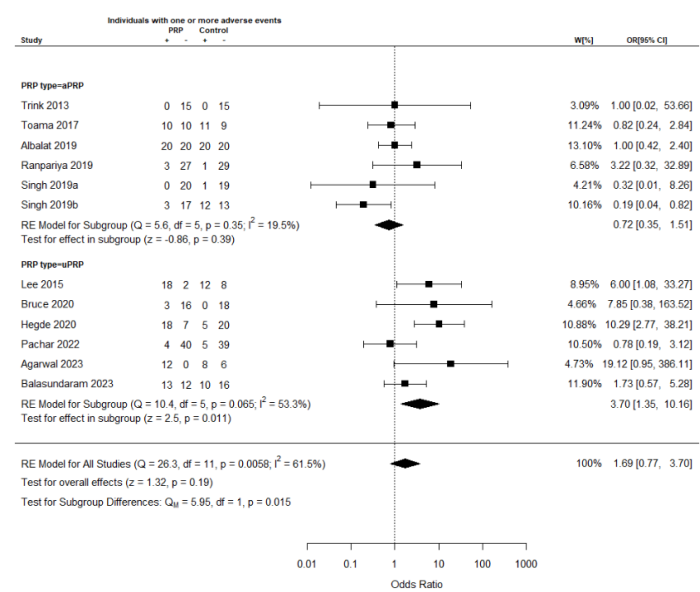
Forest plots (count data)

Adverse effects

A)



B)



C)

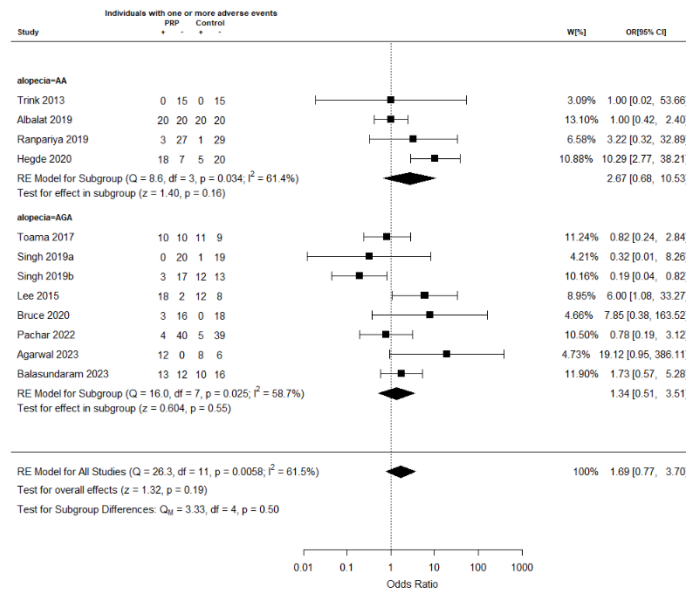
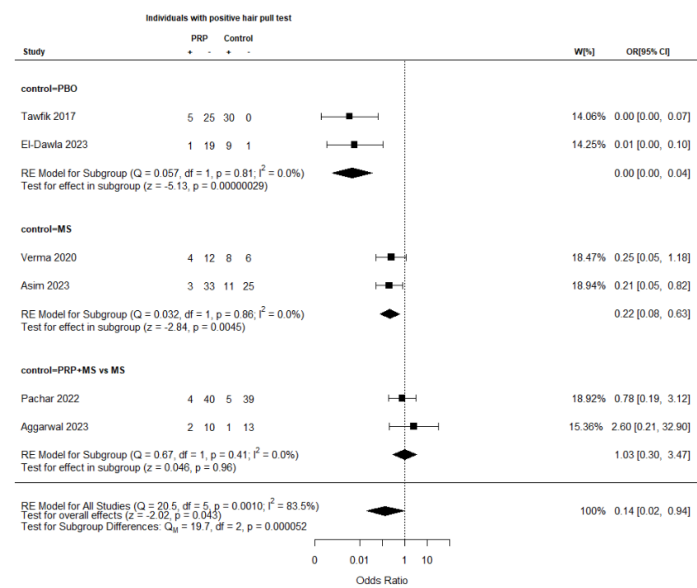


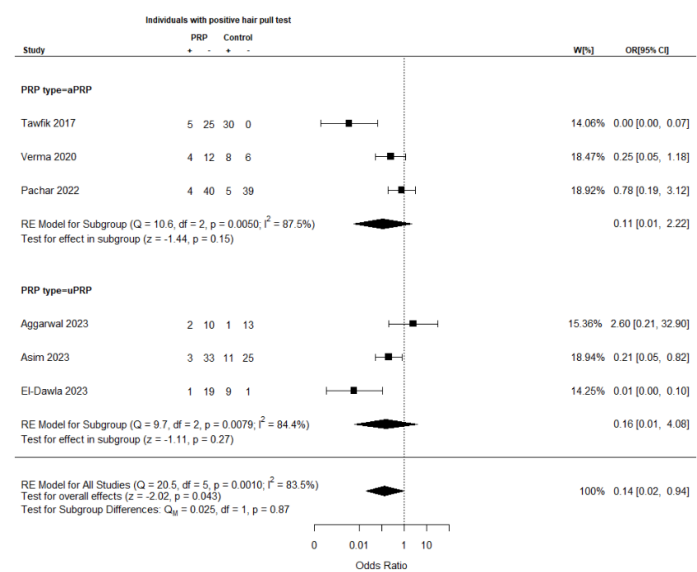
Figure S35. Forest plot of the meta-analysis on the effect of PRP alone or combined with other active substances vs. control on adverse events (proportion of patients experiencing at least one adverse effect as defined by the authors) across: A) different types of control treatment: placebo (PBO), polydeoxyribonucleotide (PDRN) or minoxidil (MS), B) different states of PRP activation: activated PRP (aPRP) and non-activated PRP (uPRP), and C) different alopecia subtypes: alopecia areata (AA) and androgenetic alopecia (AGA). Squares represent individual study Odds Ratio (OR), with 95% confidence intervals [95% CI]. Square size reflects study weight extracted from random effects meta-analysis (W[%]). The vertical line indicates no effect, and the diamond shows individual subgroup and overall estimates.

Hair loss

A)



B)



C)

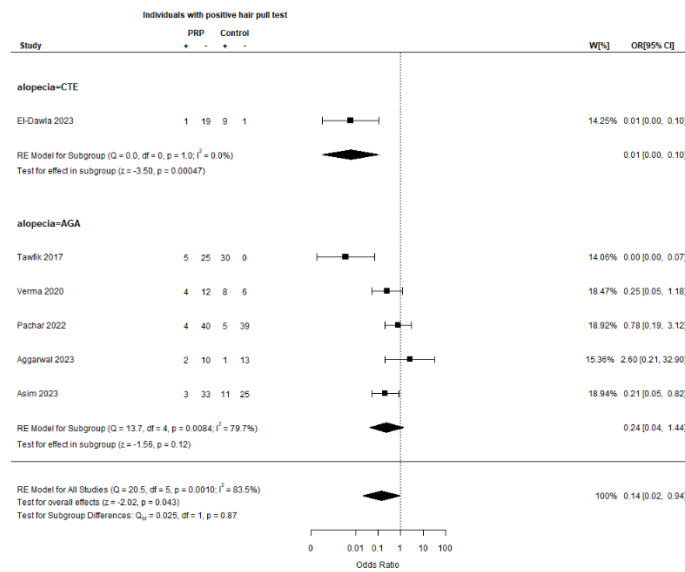
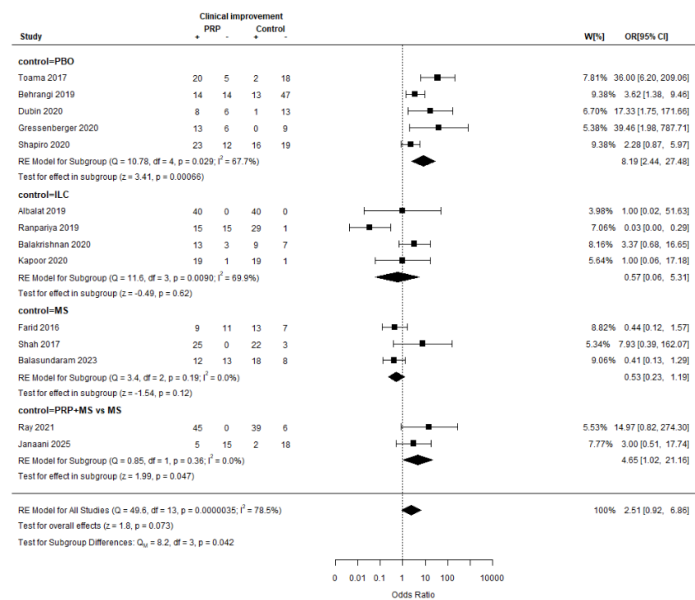


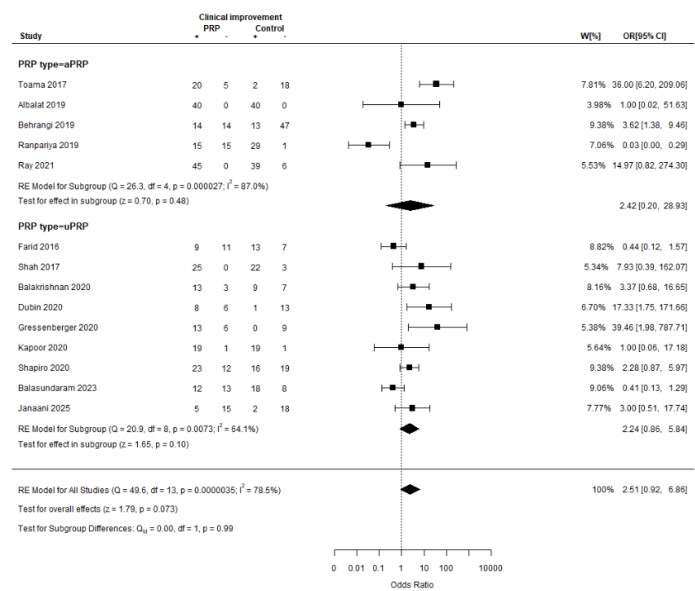
Figure S36. Forest plot of the meta-analysis on the effect of PRP alone or combined with other active substances vs. control on hair loss (proportion of patients with positive hair pull tests. Hair pull test was considered positive when three or more hairs were easily pulled out) across: A) different types of control treatment: placebo (PBO), polydeoxyribonucleotide (PDRN) or minoxidil (MS), B) different states of PRP activation: activated PRP (aPRP) and non-activated PRP (uPRP), and C) different alopecia subtypes: chronic telogen effluvium (CTE). Squares represent individual study Odds Ratio (OR), with 95% confidence intervals [95% CI]. Square size reflects study weight extracted from random effects meta-analysis (W[%]). The vertical line indicates no effect, and the diamond shows individual subgroup and overall estimates.

Clinical improvement

A)



B)



C)

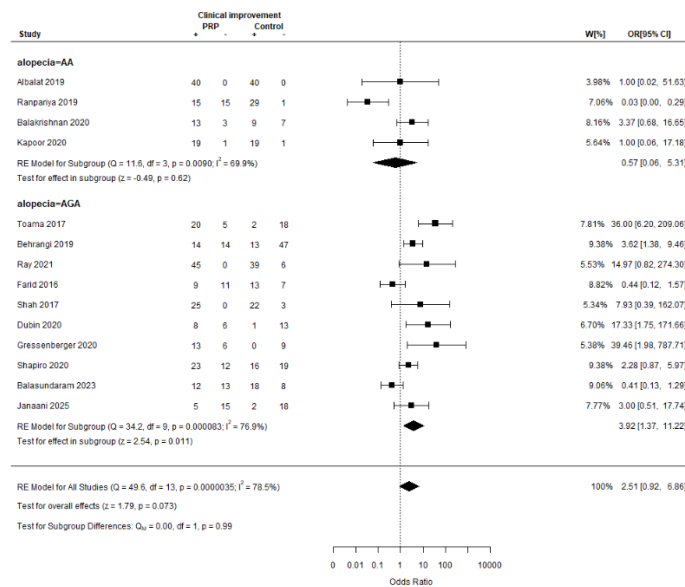
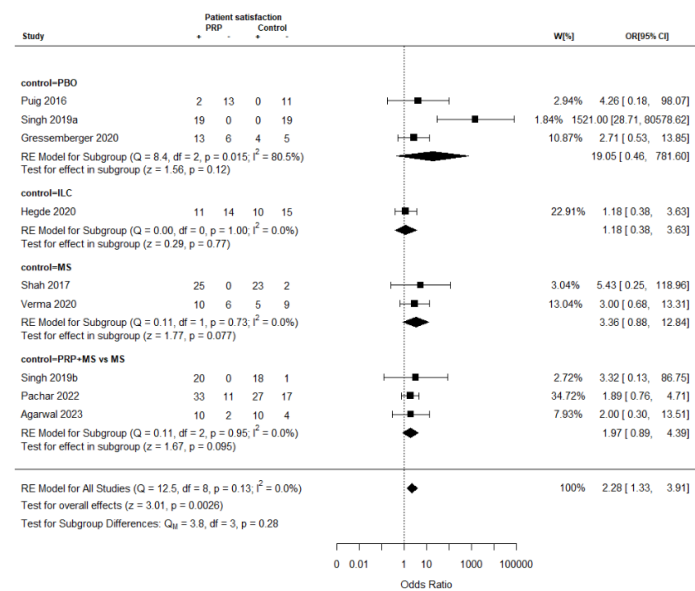


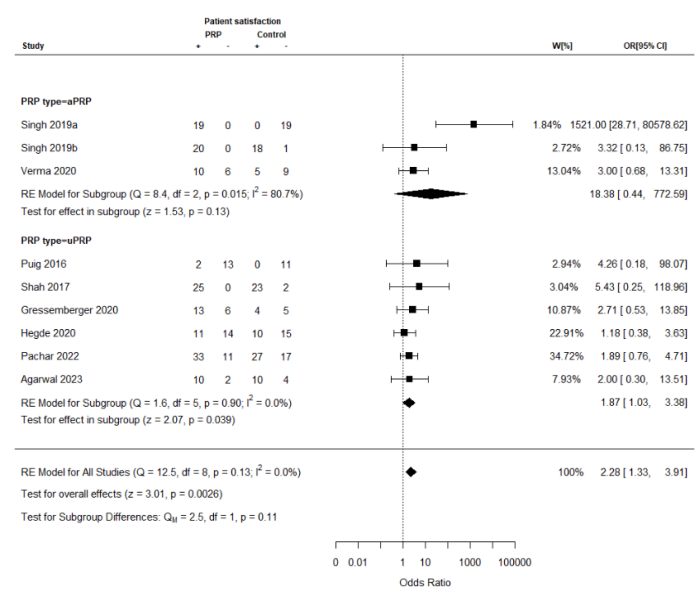
Figure S37. Forest plot of the meta-analysis on the effect of PRP alone or combined with other active substances vs. control on clinical improvement (proportion of patients exhibiting any degree of clinical improvement) across: A) different types of control treatment: placebo (PBO), polydeoxyribonucleotide (PDRN) or minoxidil (MS), B) different states of PRP activation: activated PRP (aPRP) and non-activated PRP (uPRP), and C) different alopecia subtypes. Squares represent individual study Odds Ratio (OR), with 95% confidence intervals [95% CI]. Square size reflects study weight extracted from random effects meta-analysis (W[%]). The vertical line indicates no effect, and the diamond shows individual subgroup and overall estimates.

Patient satisfaction

A)



B)



C)

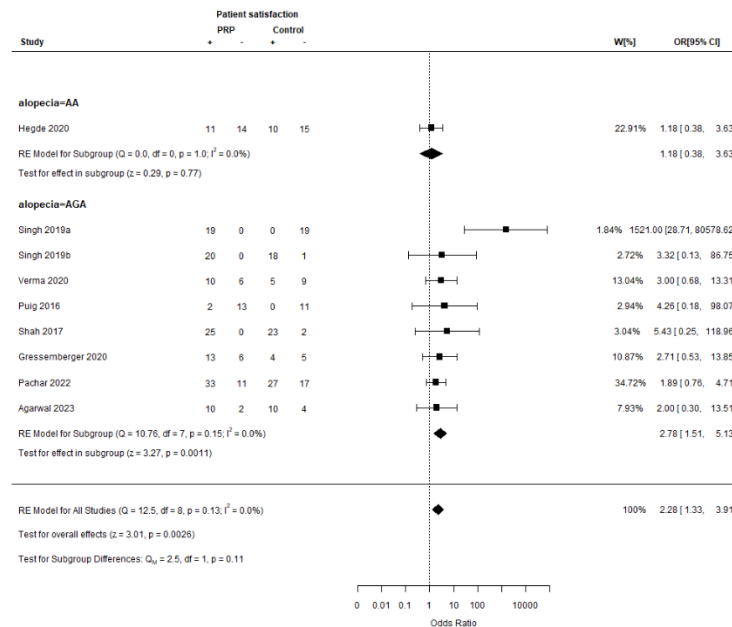


Figure S38. Forest plot of the meta-analysis on the effect of PRP alone or combined with other active substances vs. control on patient satisfaction (proportion of patients exhibiting any degree of satisfaction) across: A) different types of control treatment: placebo (PBO), polydeoxyribonucleotide (PDRN) or minoxidil (MS), B) different states of PRP activation: activated PRP (aPRP) and non-activated PRP (uPRP), and C) different alopecia subtypes: alopecia areata (AA) and androgenetic alopecia (AGA). Squares represent individual study Odds Ratio (OR), with 95% confidence intervals [95% CI]. Square size reflects study weight extracted from random effects meta-analysis (W[%]). The vertical line indicates no effect, and the diamond shows individual subgroup and overall estimates.

Recurrence

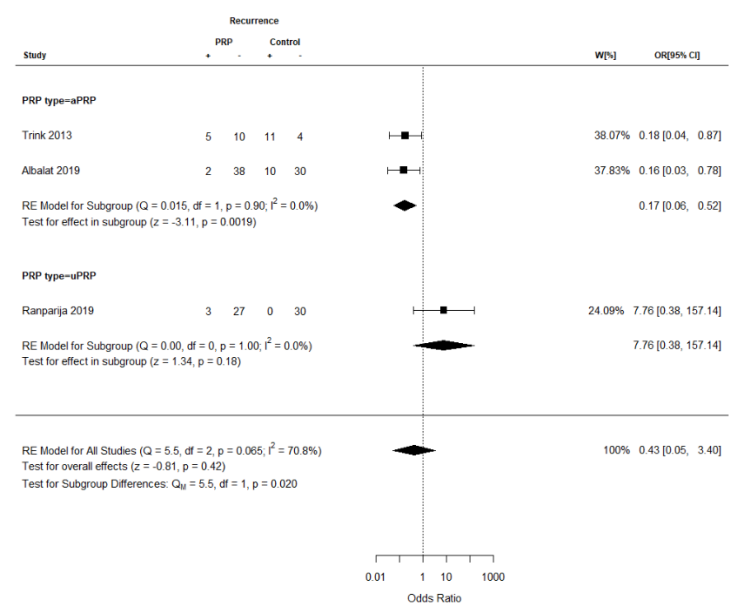


Figure S38. Forest plot of the meta-analysis on the effect of PRP alone or combined with other active substances vs. control on recurrence (proportion of patients in which recurrence was observed) across different states of PRP activation: activated PRP (aPRP) and non-activated PRP (uPRP). Squares represent individual study Odds Ratio (OR), with 95% confidence intervals [95% CI]. Square size reflects study weight extracted from random effects meta-analysis (W[%]). The vertical line indicates no effect, and the diamond shows individual subgroup and overall estimates.

