Adherence among a cohort taking progestin-only pills prescribed by a healthcare provider: Results of the BENCHMARK study

Contraception 112 (2022) 48–53

Contents lists available at ScienceDirect

Contraception

journal homepage: www.elsevier.com/locate/contraception

Original Research Article

Adherence among a cohort taking progestin-only pills prescribed by a healthcare provider: Results of the BENCHMARK study☆,☆☆

Russell D. Bradford[a,*], Sarah J. Farnsworth[a], Irene Laurora[b], Stephanie Sober[b], Hélène Guillard[c], Anna Glasier[d], Saul Shiffman[e,f]

[a] PEGUS Research, Inc, Salt Lake City, UT, United States
[b] HRA Pharma, Morristown, NJ, United States
[c] HRA Pharma, Châtillon, France
[d] Department of Obstetrics and Gynaecology, University of Edinburgh, Queen's Medical Research Institute, Edinburgh, United Kingdom
[e] Departments of Psychology, Psychiatry, Pharmaceutical Sciences, and Clinical Translational Science, University of Pittsburgh, Pittsburgh, PA, United States
[f] Pinney Associates, Pittsburgh, PA, United States

ARTICLE INFO

Article history:
Received 10 November 2021
Received in revised form 9 April 2022
Accepted 11 April 2022

Keywords:
Adherence
Oral contraceptive
POP
Progestin-only pill

ABSTRACT

Objectives: To measure adherence over six months of progestin-only pill (POP) use.
Study Design: Prospective observational cohort study measuring adherence to daily dosing and timing of dose in patients prescribed a POP, with up to six months of follow-up, conducted from January to October 2020. A pharmacy benefit manager identified potential participants with a newly prescribed POP and extended an invitation to participate. We enrolled qualified respondents by telephone, trained them to use an electronic diary to report daily whether they had taken their POP and at what time. We followed participants for up to six months. We calculated adherence to daily pill taking as the proportion of evaluable days in which a participant took a POP, and the proportion of participants reporting ≥85% adherence. We calculated adherence to same time each day as the proportion of doses taken no later than three hours after the previous dose time of day.
Results: The user population comprised 199 participants, 154 (77.4%) of whom completed six months of follow-up. The majority (n = 170, 85.4%) were taking norethindrone. Norethindrone users reported POP intake on 22,327 (96.4%) of 23,156 evaluable days, with 155 (91.2%) participants reporting ≥85% adherence; less than half (n = 73, 42.9%) reported 100% adherence. Participants reported adherence to same time each day on 21,698 of 22,157 (97.9%) evaluable days.
Conclusions: Among participants taking a prescribed POP, participants demonstrated high adherence for daily pill taking and the same time of day, though the majority were not 100% adherent.
Implications: This study reports data specific to adherence among those taking a progestin-only pill (POP) in the prescription setting. Clinicians who counsel patients about POP use should be aware that majority of patients were not 100% adherent, although most report ≥85% adherence.

1. Introduction

Progestin-only pills (POPs) contain a low dose of progestogen which is taken daily without any hormone-free interval. Clinical guidance advises taking pills at the same time every day; a POP is considered late if taken more than three hours after it should have been. However, White et al. note that this is not based on firm evidence; no clinical data are available that correlate pregnancy rates with timeliness in taking POPs [1,2]. POPs prevent pregnancy through multiple potential mechanisms, including variable inhibition of ovulation and thickening of cervical mucus to render it relatively impenetrable to sperm [3]. Two small phar-

☆ Declaration of competing interest: RD Bradford and SJ Farnsworth are employees of PEGUS Research, Inc, the contract research organization hired to conduct this study. I Laurora and H Guillard are employees of HRA Pharma, the sponsor of this study. S Sober, A Glasier and S Shiffman serve as consultants to HRA Pharma.

☆☆ Funding: This study was funded by HRA Pharma and conducted by PEGUS Research, Inc. HRA Pharma contributed to the design of the study, review of the report, and decision to submit this article for publication, but had no role in the collection or analysis of the data.

* Corresponding author.
E-mail address: bradfordr@pegus.com (R.D. Bradford).

https://doi.org/10.1016/j.contraception.2022.04.006

macokinetic studies undertaken among users taking d-norgestrel 30 mcg or norgestrel 75 mcg suggested that peak concentrations are reached about 2 hours after ingestion, and rapid distribution and elimination result in serum steroid levels near baseline after 24 hours [4,5]. Cervical mucus studies suggest that the effect of a POP on cervical mucus lasts 36 to 38 hours [6,7]. While there are no direct data that define the increased pregnancy risk associated with missing a dose or taking a pill late, the available data have been interpreted to mean that POPs are more sensitive to deviations from dosing instructions than combined oral contraceptives (COCs). If that is the case, then understanding adherence among POP users may support clinicians in providing optimal counseling and care.

2. Materials and Methods

We conducted a 24-week prospective observational cohort study entitled Baseline Evaluation of adhereNce among Consumers with Home Management of A Prescribed POP as Representative in Kind (BENCHMARK), to evaluate adherence to recommendations to take POPs every day, at the same time of day. The Sterling Institutional Review Board (Atlanta, GA) approved this study.

2.1. Recruitment

Two research companies (United Biosource Corporation, Blue Bell, PA and Healthcore, Wilmington, DE) with access to pharmacy benefits manager data (Express Scripts, St. Louis, MO and Humana Pharmacy Solutions, Lexington, KY) identified patients across the U.S. with a new prescription within the past two months for any POP available in the U.S., and no other within the past year. They sent invitations in four waves from January 16, 2020, to April 7, 2020, during which norethindrone and drospirenone were available by prescription only. Respondents either called in for telephone screening or completed an on-line questionnaire. We enrolled participants able to read, speak and understand English, assigned female at birth, aged 18 years or older, who had internet access and a smartphone or tablet, who did not work in healthcare, and who had started taking a POP within the previous two months.

2.2. Study procedures

In a standardized enrollment telephone interview, participants provided explicit verbal consent and reported brief medical history, current medication use, and demographic information. At the end of the enrollment interview we trained participants to use an app-based electronic diary (e-diary). We asked participants to record each day whether, on the day before, they had taken their POP and at what time, whether they had sexual intercourse, and whether they used any additional form(s) of contraception. When participants recorded that they missed a POP dose, the e-diary application prompted them to indicate from a list of options the reason(s) why. To avoid influencing adherence, we sent reminders to complete the e-diary every four days. The e-diary allowed participants to enter data up to 10 days in arrears and recorded the date and time of each entry.

Trained nurse interviewers collected data via up to seven telephone interviews at weeks two, four, eight, 12, 16, 20, and 24 documenting if and when participants took the POP, any adverse events (AEs), concomitant medications, and other actions related to the use of the POP. To further assess the possible impact of missing diary entries, we inquired about POP use on the missing days during scheduled telephone interviews and collected clarifications to be analyzed separately. Participants could discontinue the POP at their discretion or in consultation with their provider, which we considered distinct from nonadherence to dosing directions. If a participant elected to discontinue use of the POP, we conducted the scheduled interview and end-of-study interview and ended their participation. At the end of the study, participants performed a self-administered urine pregnancy test. The first participant was enrolled on January 23, 2020, with enrollment continuing until April 13, 2020. The final participant concluded participation on October 29, 2020.

2.3. Measures

We defined “adherence evaluation days” as the days between each participant’s first reported use of the POP through their discontinuation of the POP or study completion. We designated the primary measure of adherence as the proportion of adherence evaluation days where a diary report was available on which participants reported taking the POP. Additional analyses took into consideration whether participants took actions to mitigate pregnancy risk associated with missing a pill by using a barrier method of contraception or not having intercourse during the following 48 hours. We calculated adherence to daily use at the participant level as the proportion of participants who took their POP on at least 85% of their adherence evaluation days, representing no more than one missed pill per week on average, consistent with adherence to COCs under typical use conditions based on literature reports [8–11].

We measured participants’ use of their POP at the same time of day among all adherence evaluation days in which participants reported a dosing time. We considered dosing within three hours after the immediately previous pill’s dosing time as correct for “same-time” dosing.

For all measures we calculated simple proportions with 95% confidence interval (Exact method), excluding missing data for the primary analyses. To assess the impact of missing data, we performed best-case and worst-case sensitivity analyses in which each day with missing diary data the POP was either assumed to have been taken (best-case) or not been taken (worst-case).

We determined the target sample size of approximately 200 based on the number needed to obtain a margin of error of 5% at a proportion of 85% with a confidence level of 95%.

3. Results

3.1. Participant Characteristics

We extended 8,830 invitations, to which 354 respondents initiated screening, of whom 146 (41.2%) did not qualify, most (n = 115, 78.8%) because they had started POP use more than 2 months prior. The study flow chart (Fig. 1) documents participant screening, disposition, and participation throughout the study. Of 203 enrollees, 199 (98.0%) reported use of their POP at least once (user population), of whom 85.4% (n = 170) were taking norethindrone and comprised the adherence analysis population. About two-thirds of all enrollees (n = 141, 69.5%; 70.9% of users) completed all follow-up assessments.

Table 1 presents characteristics of the user population. Table 2 outlines the distribution of health conditions of interest, many of which included possible contraindications to estrogen [12]. Over three-quarters of participants reported at least one of the conditions of interest (n = 155, 77.9%); almost half (n = 92, 46.2%) reported current breastfeeding. Over a quarter (n = 54, 27.1%) reported having migraine headaches, more than half of whom (n = 33, 16.6%) reported migraine with aura. There were 59 participants (29.6%) with a contraindication for estrogen and 145 (72.9%) who were breastfeeding and/or had a contraindication for estrogen. Based on BMI, 52 (26.1%) were obese.

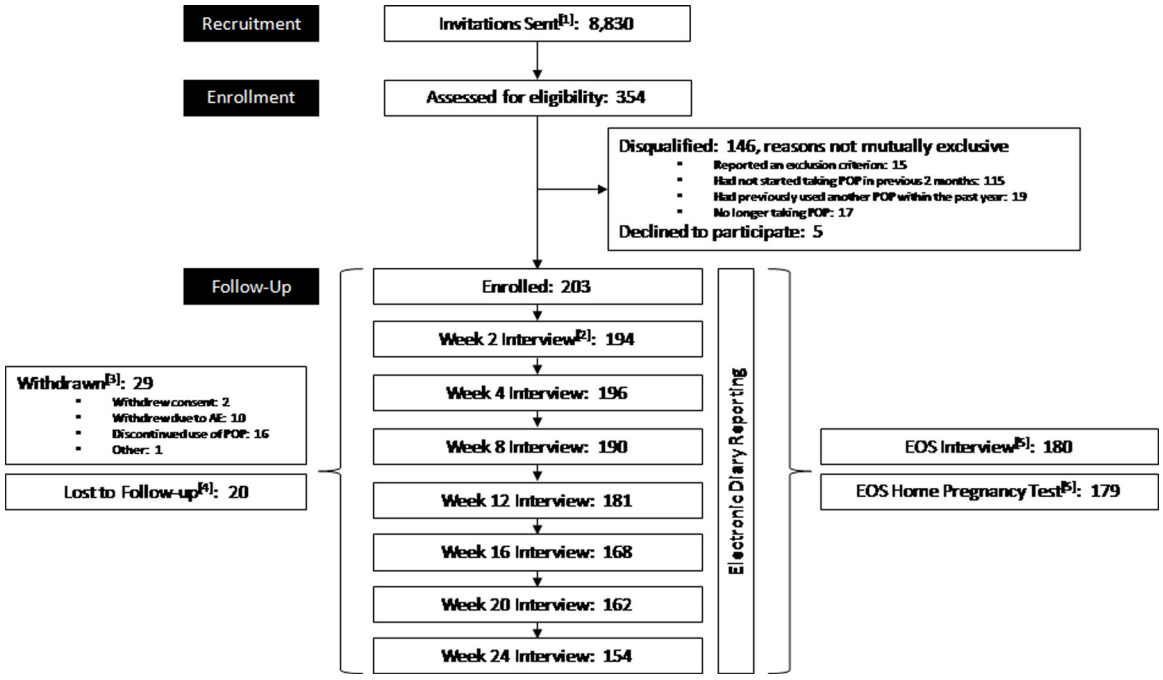

Fig. 1. Study flow diagram: Prospective cohort study of pill adherence to progestin-only pills (POP) in the U.S. from January to October 2020 [1] Not necessarily unique individuals [2] Participants who missed an interim interview allowed to continue [3] End-of-study (EOS) interview conducted at the time of withdrawal if participant willing, data provided up to time of withdrawal included in analyses [4] Data provided prior to loss to follow-up included in analyses [5] End-of-study data collection done at end of participation, whenever that occurred.

While we did not design the study to evaluate efficacy, no pregnancies were reported.

3.2. Adherence

Among the user population, participants completed their e-diary entries within four days in 90% of instances (n = 24,979 of 27,552 evaluable e-diary entries); most (n = 20,837; 75.6%) reported on the first (n = 16,018; 58.1%) or second (n = 4,819; 17.5%) day. Participants taking norethindrone reported taking the POP on 22,327 (93.7%) of 23,838 adherence evaluation days; participants reported not taking the POP on 829 (3.5%) days and e-diary data were missing for 682 (2.9%) days, yielding 96.4% (95% CI 96.3–96.7, n = 22,327 of 23,156) adherence to daily dosing. Sensitivity analyses showed worst-case adherence to be 93.7% (95% CI 93.3–94.0; n = 22,327 of 23,838) and best-case adherence to be 96.5% (95% CI 96.3–96.8; n = 23,009 of 23,838). Among 368 missing days that we were able to clarify during telephone interviews, participants reported having taken their POP on most such days (n = 350, 95.1%). Some missing days were not clarified because of missing interim interviews or time elapsed since the missing entry.

For the 829 days without POP intake, 189 (22.8%) participants reported having sex at least once that day or the following two days without using a barrier method, 71 (8.6%) reported sex with a barrier method, and 550 (66.3%) reported no sex.

When evaluated by participant, 155 (91.2%, 95% CI 85.9–95.0) were adherent to daily use of their POP on at least 85% of adherence evaluation days. Sensitivity analyses for missing days yielded estimates of 87.1% (95% CI 81.1–91.7; n = 148 of 170) under worst-case assumptions, and 91.8% (95% CI 86.6–95.4; n = 156 of 170) under best-case assumptions. As shown in Fig. 2, individual adherence ranged from 58.9% to 100%, with less than half (n = 73, 42.9%) reporting 100% adherence.

Of the 22,157 (92.9%) adherence evaluation days evaluable for time of dose, reported dosing was no more than three hours after the time of day of the previous dose on 21,698 (97.9%, 95% CI 97.7–98.1) days, with 20,695 (93.4%, 95% CI 93.1-93.7) within no more than one hour.

We performed adherence analyses for participants taking drospirenone (n = 22, 11.1%) and for those taking an unknown POP (n = 7, 3.5%) and observed no clinically meaningful differences in adherence (data not shown).

Among 959 missed doses for the entire user population, the most common reason selected was “Forgot” (n = 635, 66.2%). Reasons related to access to pills were common: “Ran out of pills – but plan to continue” was cited for 116 (12.1%) missed doses, and “Didn’t have pills with me” for 68 (7.1%). “Other reason” (no further information) was cited for 127 (13.2%).

4. Discussion

This study provides data on adherence to daily pill taking and timeliness of dosing among people taking a prescribed POP. Adherence with all types of daily medication is far from perfect, especially for preventive medications including oral contraceptives (OC) [8,9,13,14]. Published data on adherence to COCs from studies with a range of methodologies suggests that most users are not fully adherent to daily dosing and that there is significant variability in adherence behaviors between users and between cycles within the same users [8–11,14–18]. Two adherence studies for COC users with daily diaries, each with 3 months of participation, demonstrated that up to 18% of users reported missing three or more active pills per cycle [9,14].

We found that POP users are generally adherent to daily pill taking, though as with COC users, they do sometimes miss taking their pills. There is inter- and intra-participant variability in adherence behavior. The participant-level analysis demonstrates that while most participants reported high levels of adherence, the range in overall adherence level is wide.

The potential outcome of nonadherence is pregnancy. No study has directly quantified pregnancy risk or occurrence after one or more missed POPs, and while it is presumed that an extended pe-

Table 1
Demographics of new users of progestin-only pills (POP)[a] participating in a prospective cohort study on pill adherence in the U.S. from January to October 2020

	User population (N = 199)
Age category	
18–19 years	9 (4.5%)
20–30 years	64 (32.2%)
31–40 years	97 (48.7%)
41–50 years	23 (11.6%)
51 years or older	6 (3.0%)
Age (years)	32 (18-53)
Education Level	
Some high school	2 (1.0%)
High school graduate, GED, or certificate	8 (4.0%)
Some college or technical school	35 (17.6%)
College graduate	109 (54.8%)
Postgraduate degree	45 (22.6%)
Ethnicity	
Hispanic or Latino/Latina	14 (7.0%)
Not Hispanic or Latino/Latina	185 (93.0%)
Race	
Asian	8 (4.0%)
Black or African American	21 (10.6%)
White	173 (86.9%)
Other	9 (4.5%)
Estimated Household Income	
Less than $25,000 per year	8 (4.0%)
$25,001 - $50,000	28 (14.1%)
$50,001 - $75,000	35 (17.6%)
$75,001 - $100,000	47 (23.6%)
$100,001 - $150,000	42 (21.1%)
More than $150,000	38 (19.1%)
Don't know / Not sure	1 (0.5%)
Body Mass Index (kg/m^2)[b]	
<25	95 (47.7%)
25–29.9	52 (26.1%)
30–34.9	31 (15.6%)
≥35	21 (10.6%)
Prior HBC[c] Experience	
History of any HBC use	173 (86.9%)
History of oral contraceptive use	163 (81.9%)
No history of oral contraceptive use	10 (5.0%)
No history of HBC use	26 (13.1%)
Current POP[a] type	
Norethindrone	170 (85.4%)
Drospirenone	22 (11.1%)
Other/Don't Know	7 (3.5%)
Geographic Region	
Northeast	34 (17.1%)
Southeast	62 (31.2%)
Midwest	43 (21.6%)
West	35 (17.6%)
Southwest	25 (12.6%)

[a] Progestin-only pill.
[b] BMI calculated from self-reported height and weight.
[c] Hormonal birth control.

Table 2
Health conditions of interest among new users of progestin-only pills participating in a prospective cohort study on pill adherence in the U.S. from January to October 2020

	All users (N = 199)
Self-reported health conditions of interest	
Ever been diagnosed with cancer	1 (0.5%)
Liver problems	1 (0.5%)
High blood pressure	20 (10.1%)
Gallbladder disease	0 (0.0%)
High cholesterol	7 (3.5%)
Diabetes	0 (0.0%)
Migraines with aura	33 (16.6%)
Migraines without aura	21 (10.6%)
Blood clot history	0 (0.0%)
Heart disease	2 (1.0%)
History of heart attack or stroke	0 (0.0%)
Current smoker	11 (5.5%)
Currently breastfeeding	92 (46.2%)
Total Number of Participants Who Report Having at Least one of the Health Conditions of Interest	155 (77.9%)
Total Number of Participants Contraindicated for Use of an estrogen-containing contraceptive[a]	59 (29.6%)
Total Number of Participants Contraindicated for Use of an estrogen-containing contraceptive[a] and/or Breastfeeding	145 (72.9%)

[a] Participants who reported at least one of the following: migraine with aura, smokers age 35 and older, breast cancer, hypertension, heart disease, liver problems, or history of blood clots, stroke, or heart attack.

riod of nonadherence is likely to increase pregnancy risk, there are no data to suggest how episodic nonadherence relates to pregnancy risk.

According to prescribing information, norgestrel should be taken at the same time each day, within a three-hour window. The literature on OC adherence suggests that adherence to "same time" directions is limited. In two studies evaluating dose timing in COC users, the majority of pills were not taken within two hours of the time of day of the previous dose [11,18]. Participants in our study reported a high degree of adherence to the recommendation to take the pill at the same time each day, doing so on 97.9% of evaluable days. The expected impact of departures from "same-time" directions on pregnancy risk in POP users is difficult to evaluate, especially as the three-hour window recommendation is based on limited pharmacokinetic data [4,5].

There is considerable interest and support from the medical community in expanding access to oral contraceptives by making them available over-the-counter [19,20]. The favorable safety profile of POPs make them prime candidates for a first over-the-counter oral contraceptive in the U.S.[19,21]. We found that some nonadherence was attributable to limitations in access to the medication; in one out of five instances of nonadherence, participants reported that they had run out of pills but planned to continue, or that they did not have their pill with them. Over-the-counter access to an oral contraceptive would reduce such barriers. Participants in our study may have been given directions on daily same-time dosing. Of course, carrying out those directions still rests with the user. Review of available studies suggests that provider counseling may not improve adherence [22].

Strengths of this study include a sample comprising patients who were prescribed a POP in the context of a natural interaction with a healthcare provider. We collected adherence data prospectively using a daily electronic diary on the participants' own devices. Contemporaneous reporting of sexual activity and any use of additional methods of contraception inform pregnancy risk associated with missing doses. We collected up to 24 weeks of daily use data from participants. Missing data were minimal, and sensitivity analyses outline best- and worst-case adherence measures, and diary clarification efforts provided context for understanding missing diary entries. The large number of adherence evaluation days allows for a relatively precise estimate of overall adherence.

Our study was limited by omission of uninsured participants. While we did not collect data on the nature of insurance coverage, the pharmacy benefits managers we used included both private and public plans. The number of participants taking drospirenone, a newer POP, is small. While the dosing instructions for drospirenone advise users to take it at the same time every day, they do not include the three-hour window instruction. We began collecting data up to two months into use, which may bias overall measures of adherence by either missing the adherence in the first weeks of use, or by omitting those who stopped use within two months. Study measurement procedures may have influenced participants' adherence.

Sample characteristics may limit generalizability to contraception-seeking women in general. Our sample was older

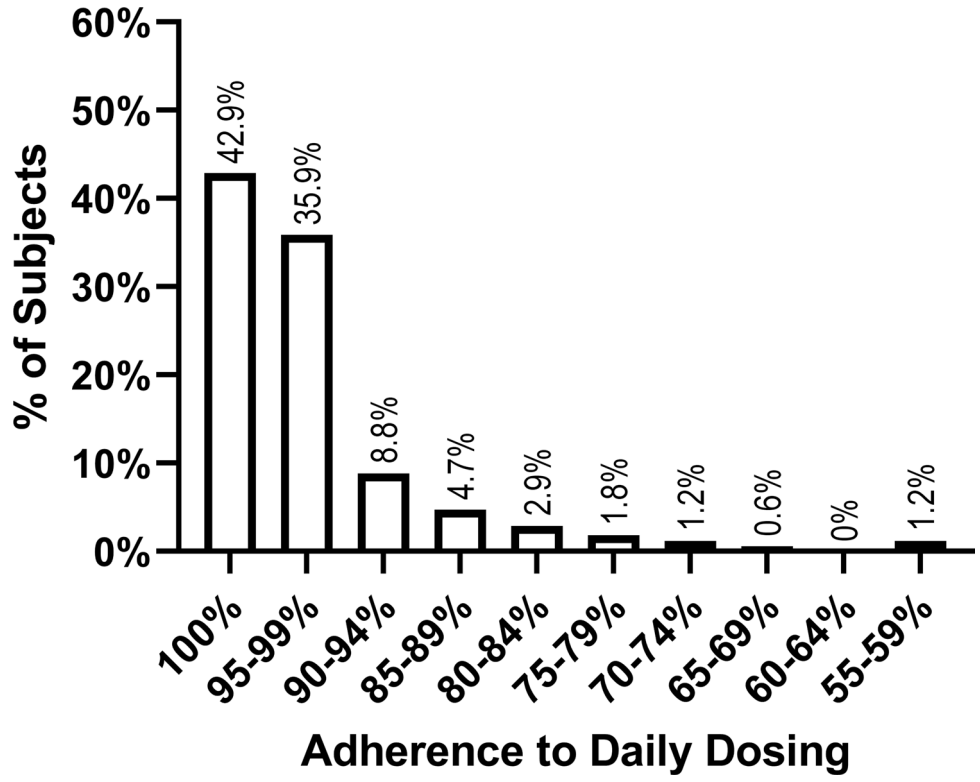

Fig. 2. Participant level adherence among new users of progestin-only pills participating in a prospective cohort study on pill adherence in the U.S. from January to October 2020.

and more educated than the general population of oral contraceptive users in the U.S.[23] In the US, POPs are typically used in those who are breastfeeding or who have a medical contraindication to estrogen, which may also be influenced by age. Oral contraceptive users that are older, have more years of education, higher levels of health literacy, and/or better socioeconomic status have comparatively greater odds of adherence and oral contraceptive continuation, so this study may represent a best-case sample for adherence, and over-estimate adherence for a more general population of OC users [23–26]. Nearly half of the study participants reported breastfeeding, with another quarter reporting a history of migraine headaches. This contrasts with the expected characteristics of a general oral contraceptive user population, which might be expected to be younger and healthier, with a much smaller proportion of those who are recently postpartum.

In summary, participants were largely adherent to daily pill taking, though missed pills were not uncommon. They were also highly adherent to the recommendation to take the product at the same time every day.

Acknowledgments

The authors would like to offer a very special thanks to all those participants who agreed to enroll in this study, sharing with us their personal experiences and contributing to our collective understanding of how POPs are used. We also thank all of those at PEGUS Research, Pinney Associates and HRA Pharma who contributed to the conduct of this study and this manuscript. We especially appreciate Lucy Owen's skilled editorial review.

References

[1] White K, Potter JE, Hopkins K, Fernández L, Amastae J, Grossman D. Contraindications to progestin-only oral contraceptive pills among reproductive-aged women. Contraception 2012;86:199–203. doi:10.1016/J.CONTRACEPTION.2012.01.008.

[2] Raymond EG, et al. Progestin-only pills. In: Hatcher RA, Trussell J, Nelson AL, et al., editors. Contracept Technol. New York: Ardent Media, Inc; 2011. p. 237–47.

[3] McCann MF, Potter LS. Progestin-only oral contraception: a comprehensive review. Contraception 1994;50:S13–21. doi:10.1016/0010-7824(94)90114-7.

[4] Weiner E, Victor A, Johansson ED. Plasma levels of d-norgestrel after oral administration. Contraception 1976;14:563–70. doi:10.1016/0010-7824(76)90007-x.

[5] Brenner PF, Mishell DR, Stanczyk FZ, Goebelsmann U. Serum levels of d-norgestrel, luteinizing hormone, follicle-stimulating hormone, estradiol, and progesterone in women during and following ingestion of combination oral contraceptives containing dl-norgestrel. Am J Obstet Gynecol 1977;129:133–40. doi:10.1016/0002-9378(77)90733-5.

[6] Chretien FC, Sureau C, Neau C. Experimental study of cervical blockage induced by continuous low-dose oral progestogens. Contraception 1980;22:445–56. doi:10.1016/0010-7824(80)90098-0.

[7] Lebech PE, Svendsen PA, Ostergaard E. The effects of small doses of megestrol acetate on the cervical mucus. Int J Fertil 1970;15:65–76.

[8] Hou MY, Hurwitz S, Kavanagh E, Fortin J, Goldberg AB. Using daily text-message reminders to improve adherence with oral contraceptives. Obstetrics & Gynecology 2010;116:633–40. doi:10.1097/AOG.0b013e3181eb6b0f.

[9] Potter L, Oakley D, de Leon-Wong E, Canamar R. Measuring compliance among oral contraceptive users. Family Planning Perspectives 1996;28:154–8. doi:10.2307/2136191.

[10] Huber LRB, Broel EC, Mitchelides AN, Dmochowski J, Dulin M, Scholes D. Comparison of prospective daily diaries and retrospective recall to measure oral contraceptive adherence. Contraception 2013;88:492–7. doi:10.1016/j.contraception.2013.02.007.

[11] Oakley D, Sereika S, Bogue EL. Oral contraceptive pill use after an initial visit to a family planning clinic. Family Plann Perspect 1991;23:150–4. doi:10.2307/2135737.

[12] Curtis KM, Tepper NK, Jatlaoui TC, Berry-Bibee E, Horton LG, Zapata LB, et al. U.S. Medical eligibility criteria for contraceptive use, 2016. MMWR Recommend Rep 2016;65:1–103. doi:10.15585/mmwr.rr6503a1.

[13] Durand H, Hayes P, Morrissey EC, Newell J, Casey M, Murphy AW, et al. Medication adherence among patients with apparent treatment-resistant hypertension. J Hypertension 2017;35:2346–57. doi:10.1097/hjh.0000000000001502.

[14] Fox MC, Creinin MD, Murthy AS, Harwood B, Reid LM. Feasibility study of the use of a daily electronic mail reminder to improve oral contraceptive compliance. Contraception 2003;68:365–71. doi:10.1016/j.contraception.2003.08.013.

[15] Woods JL, Shew ML, Tu W, Ofner S, Ott MA, Fortenberry JD. Patterns of oral contraceptive pill-taking and condom use among adolescent contraceptive pill users. J Adolescent Health 2006;39:381–7. doi:10.1016/j.jadohealth.2005.12.014.

[16] Hughey AB, Neustadt AB, Mistretta SQ, Tilmon SJ, Gilliam ML. Daily context

matters: predictors of missed oral contraceptive pills among college and graduate students. Am J Obstetr Gynecol 2010;203:323.e1–323.e7. doi:10.1016/j.ajog.2010.05.039.
[17] Aubeny E, Buhler M, Colau JC, Vicaut E, Zadikian M, Childs M. The Coraliance study: non-compliant behavior. Results after a 6-month follow-up of patients on oral contraceptives. Eur J Contraception Reprod Health Care 2004;9:267–77. doi:10.1080/13625180400017776.
[18] Wiegratz I, Elliesen J, Paoletti AM, Walzer A, Kirsch B. Adherence with ethinylestradiol 20 μg/drospirenone 3 mg in a flexible extended regimen supported by the use of a digital tablet dispenser with or without acoustic alarm: an open-label, randomized, multicenter study. Int J Womens Health 2015;7:19–29. doi:10.2147/IJWH.S71906.
[19] OCs OTC Working Group. Statement of Purpose 2016. https://ocsotc.org/statement-of-purpose/(accessed February 1, 2022).
[20] Over-the-Counter Access to Hormonal Contraception: ACOG Committee Opinion, Number 788. Obstet Gynecol 2019;134:E96–105. doi:10.1097/AOG.0000000000003473.
[21] OCs OTC Working Group. Over-the-counter birth control: background on progestin-only pills n.d. https://ocsotc.org/wp-content/uploads/2016/09/Increasing-OC-access-with-the-POP_9-16-2016-FINAL.pdf (accessed February 1, 2022).
[22] Mack N, Crawford TJ, Guise J-M, Chen M, Grey TW, Feldblum PJ, et al. Strategies to improve adherence and continuation of shorter-term hormonal methods of contraception. Cochrane Database Systematic Rev 2019;2019. doi:10.1002/14651858.CD004317.pub5.
[23] Emans SJ, Grace E, Woods ER, Smith DE, Klein K, Merola J. Adolescents' compliance with the use of oral contraceptives. JAMA 1987;257:3377–81. doi:10.1001/jama.1987.03390240083028.
[24] Rosenberg MJ, Burnhill MS, Waugh MS, Grimes DA, Hillard PJA. Compliance and oral contraceptives: a review. Contraception 1995;52:137–41. doi:10.1016/0010-7824(95)00161-3.
[25] Hall KS, Castaño PM, Westhoff CL. The influence of oral contraceptive knowledge on oral contraceptive continuation among young women. J Women's Health 2014;23:596–601. doi:10.1089/jwh.2013.4574.
[26] Liddelow C, Mullan B, Boyes M. Adherence to the oral contraceptive pill: the roles of health literacy and knowledge. Health Psychol Behav Med 2020;8:587–600. doi:10.1080/21642850.2020.1850288.