Hormonal contraceptive practices in young Australian women (≤ 25 years) and their possible impact on menstrual frequency and iron requirements.

A Greig[a], M Palmer[a], L Chepulis[*a]

[a] School of Public Health, Griffith University, Gold Coast, Australia

* Corresponding Author

Dr Lynne Chepulis

Ph: + 61 7 5552 7707

Fax: + 61 7 5552 8042

Email: l.chepulis@griffith.edu.au

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Abstract

Objective: To investigate the hormonal contraceptive practices of female university students aged ≤ 25 years, to determine their current contraceptive practices, menstrual bleeding frequency, the prevalence of medically-diagnosed iron deficiency and factors that might increase the risk of iron deficiency.

Methods: A 20 item questionnaire was distributed to female students at the Griffith University, Gold Coast campus. This included four primary areas: demographics, the prevalence of medically diagnosed iron deficiency and any factors that may increase their risk of iron deficiency, menstrual bleeding frequency, current contraceptive practices and interest in future oral contraceptive regimens that reduce menstrual bleeding frequency and duration.

Results: 852 participants completed the questionnaire, ~2/3rds of respondents are currently using a hormonal contraceptive, with the oral contraceptive pill (OCP) being the most common (63% of all respondents). Most women (73.3%) reported monthly menstruation, although 14.1% indicated that they sometimes missed their monthly period, with bleeding every two months. Of all OCP users, approximately 2/3rds have skipped their monthly period at some time (and would do so again), the most common reasons being for convenience (89%).

Conclusion: OCP use is high in Australian women, with many being interested in the concept of using the OCP to delay menstruation. Prolonged intake of the active tablets may therefore provide an effective means for reducing blood and iron loss in young women.

Implications: With the immense prevalence of OCP use and the information already known about associated reductions in menstrual bleeding with hormonal contraceptive use, its effect of in this population may be substantial.

Key words: Iron deficiency, menstrual bleeding frequency, hormonal contraception.

1. Introduction

Iron deficiency is a worldwide nutritional crisis[1], primarily affecting reproductive-aged females, with 1 in 3 being diagnosed before the age of 45 [2]. These females are at an increased risk of iron deficiency due to the blood loss that occurs during menstruation and childbirth [3]. On average females lose between 20 and 35 ml of blood per month, which equates to 11 mg of iron, but this can be as high as 80 ml of blood per month in some cases [4]. Iron can also be lost via other means of blood loss including nose bleeds and blood donation [5,6].

To compensate for this blood loss females aged 19–30 have recommended dietary iron requirements of 18 mg/day compared to only 8 mg/day in men of the same age [7]. However, these guidelines do not take into account the contraceptive practices of young women, particularly whether they are reducing blood and iron loss by using hormonal contraceptives to reduce menstrual duration and/or frequency. Hormonal contraceptives are commonly used by females of reproductive age. The most common of these is the oral contraceptive pill (OCP), with prevalence rates of 25–76% in Australia [8-10] and 37–57% worldwide [5,11-13].

Furthermore, OCP use has been demonstrated to result in a 50% reduction in monthly menstrual blood loss [14]. Hormonal contraceptives can also be used to improve menstruation related problems (such as bloating, nausea, abdominal pain and mood changes) and more recently, to reduce menstrual bleeding frequency. By using the contraceptive injection, implant or hormonal intra-uterine device females can avoid menstrual bleeding for up to three months [15]. In addition, by following an extended oral contraceptive pill regimen, females can potentially reduce their menstrual frequency and blood loss even further.

The standard 28-day regimen has been extended to an 84-day regimen in the US with the development of the brand *Seasonale*. This thereby reduces the frequency of menstrual blood loss to one week in every 12 weeks rather than once every 4 weeks [16]. This extended oral contraceptive regimen has stimulated the interest of many females, physicians and researchers alike. Its efficacy and safety have been determined [15].

This study was designed to evaluate the current contraceptive practices of female university students. The effect that these practices have on their menstruation has also been examined and a subjective assessment of iron status has been obtained.

2. Subjects and Methods

Eight hundred and fifty one women who were attending classes (undergraduate and/or postgraduate) at the Gold campus Griffith University, Queensland Australia volunteered to complete a cross-sectional, 20-item questionnaire. This represents 10.5% of the total student population on this campus (n=8067 in Semester 1, 2009). The questionnaire was designed to investigate current hormonal contraceptive practices in young university-aged women ($\leq$ 25 years) and to determine whether their contraceptive use (or lack thereof) impacted on their patterns of menstruation.

The questionnaire was designed in two sections: Section A collated demographic data and asked questions relating to contraceptive use, frequency of menstruation and prevalence of risk factors (including eating meat less than twice a week, regular nose bleeds, endurance athletics, blood donations and pregnancy) that could lead to lower than normal iron levels. Demographic data was collected regarding the approximate age of the respondent, their level of study, their ethnicity, height and weight (if known). Respondents were also asked if they were enrolled in a Health Sciences program as it was suggested that data from these students may be biased because of their enhanced level of understanding. Contraception questions

were centred on the type of hormonal contraception used (none, oral contraceptive pill (OCP), implant, inter-uterine device or injection), the length of time on their current regimen, and their intentions for future hormonal contraceptive use. Menstruation questions were centred on frequency of menstruation.

Section B was targeted at those using the oral contraceptive pill (OCP), and asked questions about past and present OCP usage patterns (*i.e.* whether respondents regularly followed the package instructions and took the 21 days active tablets followed by 7 days of inactive tablets, or whether they 'skipped' a menstrual period and continued to take the active tablets for a longer period of time). OCP users who had skipped their menstrual period were also evaluated as to why they chose to reduce their menstrual frequency and what their predicted future usage patterns may be. All of the answers in the questionnaire were categorical in nature; however, space was allowed at the end of questionnaire for any comments.

The questionnaire was initially piloted using 12 participants (both staff and students) in the School of Public Health and Griffith University. Questions were then modified for brevity and clarity.

Ethical approval was received from Griffith University Human Research Ethics Committee on the 8th January 2009 (research protocol number PBH/50/08/ HREC). Data collection was carried out during March and April 2009.

Statistical Analysis

Descriptive statistics were used to identify the frequency of certain data points including intention-to-continue current contraceptive practice (impact factor), contraceptive use by type and length of time, frequency of menstruation, prevalence of skipping and reasons behind skipping the OCP and seeking medical approval.

The data collected from the questionnaires was predominately categorical data. Cross tabulation (Chi-squared distribution tests) was used to assess differences amongst the data set.

Qualitative data was analysed by categorising responses thematically and looking at trends amongst respondents. Continuous data (number of self-reported factors increasing respondents risk of iron deficiency, comments on the oral contraceptive pill that reduces the frequency or duration of menstrual bleeding and doctors comments) was analysed using parametric independent samples t-tests or one-way ANOVA or the non-parametric equivalent if needed. Statistical significance was accepted with a p value of < 0.05.

Collected data were analysed using the Statistical Package for Social Sciences for Windows version 17.0 (SPSS). Data was continuously cross checked by the researcher during data entry and 10% of data was cross checked by an external body.

Results

Demographic Information

Overall, 851 female volunteers aged $\leq$ 25 years completed a questionnaire, constituting 10.5% of the student population. Due to the ethnic diversity on campus, 21.1% of respondents were international (the most common being Chinese; 4.8%), with the remaining 78.9% being either native Australian (including Aboriginal and Torres Straight Islanders) or New Zealand citizens. The majority of students were from undergraduate programs (793/851), and 50% were partaking in a Health Sciences degree.

Current hormonal contraceptive practices

Approximately 2/3rds of all respondents were using some form of hormonal contraceptive (OCP, implant, inter-uterine device or injection; total 66.5%), and there was no difference when analysed according to age (64.7% (17–20 years) *vs* 67.6% (21–25 years). The remaining 33.5% of respondents reported not using any form of hormonal contraceptive.

From the 851 respondents that answered the question, the OCP was by far the most popular choice of hormonal contraception with 63% of all women reporting that they currently use it. Usage rates of all other hormonal contraceptives were below 2% (see Table 1). When data from only hormonal contraceptive users was analysed independently (n=547), OCP usage increased to 94.7% (see Table 1).

The current length of respondents' hormonal contraceptive practice ranged from <1 to >5 years, although 62.7% of users had been using this means of contraception for between 1 and 5 years (see Table 2). When analysed according to age, more than twice as many 17–20 year olds had been using a hormonal contraceptive for only 1–2 years compared with 21–25 year olds (38.4% *vs* 17.0%; $p < 0.0001$). Similarly, older participants (21–25 years) were more likely to have used their hormonal contraceptive for > 5 years ($p < 0.0001$). This is likely a reflection of the number of years that the individuals have been sexually active for.

Of all hormonal contraceptive users, 48.9% indicated that they planned on continuing their current hormonal contraceptive regimen for an indefinite amount of time. Further, 14.2%, 20.6% and16.3% indicated that they planned to stop using their current form of hormonal contraception after ≤ 2 years, 3–5 years and >5 years, respectively; however, there is no record of whether these users plan to change to an alternative type of hormonal contraceptive, or whether they plan on ceasing their use entirely.

Current Menstrual Frequency

No statistically significant differences in bleeding frequency were observed between hormonal contraceptive users and those not using hormonal contraceptives. Of the 848 respondents who answered the question, 622 women (73.3%) reported that they had monthly (or 28-day) menstrual bleeding. A much smaller group reported that they usually had menstrual bleeding every month but occasionally every two months (14.1%), with less than 4% each reporting that they had menstruation every 2, 3 or $\geq$ 6 months (see Table 3).

Of the 518 individuals using the OCP who answered the question, 75.6% reported that they generally follow a 28-day cycle. Further, 331 of 511 women (64.8%) indicated that they had delayed menstruation at some time in their lives by not taking the inactive tablets and continuing to take the active tablets for longer than 21 days. The primary reported reasons for this were for convenience (89%), to avoid negative symptoms associated with menstruation (including headaches, nausea, bloating and mood changes, 22%) and because their menstrual periods were associated with heavy blood loss (20%) (respondents were able to select more than one reason when answering this question).

Two thirds (69.8%) of all respondents reported that they would be interested in taking a contraceptive that allowed for either a reduced number of bleeding days or less frequent bleeding. The most commonly reported reason for respondents to be interested in this type of regimen was the convenience of reduced menstrual blood loss. Another common them was "if the safety of this regimen can be assured then they would be interested". Those not interested in the regimen, made comments such as "happy with current contraception" or "not using any hormonal contraceptives".

Of the 518 respondents who were currently using the OCP and had expressed an interested in using an oral contraceptive to reduce the frequency or duration of menstrual blood loss, 331 reported that they had previously skipped their inactive tablets at some time.

Furthermore 144 of the 331 women (43.5%) who had skipped the inactive tablets at least once reported that they had previously discussed this with their Doctor.

Incidence of Risk Factors for Low Iron Levels

Eight hundred and fifty women answered the question on iron risk factors, and several risk factors were identified in this study. In particular, 48.2% reported that they usually ate less than 2 meals of meat per week. These numbers differed when analysed according to age, with those aged 17–20 years reporting a 10% higher incidence of this risk factor than those aged 21-25 (55.1% vs 44.9%; $p < 0.001$). The prevalence of other risk factors that could contribute to low iron levels was much lower in the overall group: blood donations in the last year (14.9%), vegetarian (5.8%), endurance athlete (5.8%), previously pregnant at some time in life (3.8%) and recurring nose bleeds (2.8%). The majority of participants had only one risk factor, and no differences were observed between the two age groups for the number of risk factors.

Further, of the 851 respondents, 26.8% reported that they had previously been medically diagnosed with iron deficiency. Similarly, 350 women (41.1%) reported that they had taken iron supplements within the last 12 months. However, it was not recorded whether this was prescribed or self-medicated, or whether these individuals considered a typical multi-vitamin to be an iron supplement.

3. Discussion

As the results of this study have demonstrated, hormonal contraceptive use is high in young Australian women, with 66.5% of all women surveyed using either the OCP, implant, inter-uterine device or the injection. The data agrees with other Australian studies that the

OCP is the most commonly used hormonal contraceptive (ranging from 33.6% in 2007 in ACT to 43.3% in 1999 in NSW [10, 17-19]), although importantly, it also reports the rates of use of other hormonal contraceptives in young Australians, something that these other published studies have not addressed. The rates of use of the implant (2.8%), intra-uterine device (0.9%) and injection (1.4%) were particularly low in this study, which may account for why data on the prevalence of these hormonal contraceptives have not been reported in Australia previously. However, there is some limited data from other countries. Intra-uterine device usage has been shown to range from 1.8% in New Zealand to 27% in Nigeria, whilst the injection and the implant ranged from 2% Shanghai to 53% in South Africa [9,11,13]. It is likely that cultural influences are responsible for the higher rates of use of these hormonal contraceptives in certain countries.

As well as providing effective contraception, most hormonal contraceptives also reduce the volume of menstrual blood lost each cycle [20]. Indeed, the oral contraceptive pill has been shown to reduce menstrual blood loss by up to 50% [20]. Amenorrhea has even been reported in females using the progesterone intra-uterine device, the injection or the implant; however, this usually only occurs after prolonged use (~12 months) [21-24]. As expected, the respondents in this study who reported infrequent menstrual bleeding (every month but occasionally every two months, or every two months or more) tended to be using hormonal contraception. These females may likely have had a reduced amount of menstrual blood loss compared with the respondents not currently using hormonal contraceptives [11, 25,26].

Reduced blood loss is obviously going to occur in individuals that regularly do not have menstrual bleeding, whether it be by choice or for medical reasons. However, in Australia, the prescription of the extended regimen of the OCP is not common, and it is generally not available to females who simply have a preference towards amenorrhea [27]. The only extended OCP regimens available in Australia are designed to treat menstrual disorders such

as menorrhagia and endometriosis [27], although, medically, the use of the OCP in this fashion (continuously taking the active tablets for more than 21 days) is deemed to be safe [16]. As the data from this study demonstrates, though, young women are regularly using the OCP to 'skip' menstruation, with most reporting that they are doing it primarily for convenience. Overall, 65% of the OCP users in this study (331 women) reported that they had delayed menstruation at some point in their lives, and 70% of all respondents (594 women) indicated that they would be interested in a contraceptive that would allow them to have reduced frequency of bleeding. This data would suggest that medical practitioners in Australia should be re-evaluating the extended regimen use in young women, so that it may at least occur in a medically supervised manner.

In contrast, extended OCP use is an established practice in the US, with 91-day cycles leading to improved endometrial microstructure and significantly reduced menstrual bleeding [28]. In fact, a study from 2006 reported that over three quarters of the doctors sampled in their study regularly prescribed an extended oral contraceptive regimens to accommodate patients' requests for amenorrhea [29]. As with the current study, the primary reason for skipping the inactive pill amongst respondents was the convenience of reduced menstruation [30-32]. Further, these studies also showed that the many of their respondents reported the reason for skipping the inactive pills was to reduce menstrual-related symptoms [31]. Close to one quarter of respondents from our study indicated that they had skipped the inactive pill due to menstrual related symptoms, including bloating, abdominal pain, headaches and mood changes.

Importantly, one of the major implications of reduced menstruation is that it may contribute to reducing iron loss in at-risk women. Data from the current study demonstrated that approximately one quarter of all the women surveyed had been previously diagnosed with iron deficiency, and that this may largely be a result of low dietary iron intakes as 48%

of women ate less than two meals of meat per week and 5.8% were vegetarian. This data agrees well with research conducted in New South Wales that determined that 45% of the reproductive-aged females involved in their study reported having restricted meat (including poultry) intake which was found to have had a large impact on their iron status [33]. Interestingly, self-reported factors that may increase the risk of iron deficiency were most commonly reported amongst respondents who also reported having the lowest menstrual bleeding frequency (every two months or more). Therefore, these respondents may be inadvertently decreasing this risk of iron deficiency by having lower frequency of menstrual bleeding. Respondents with higher a frequency of menstrual blood loss (monthly) reported fewer factors that may increase their risk of iron deficiency and were less likely to take iron supplements. Further studies need to be undertaken in this area to better assess the impact that extended OCP use /reduced menstrual bleeding frequency is having on actual iron stores, particularly in women who do present with risk factors for iron deficiency.

As with all qualitative studies, there are a number of limitations that may have affected the outcomes in this study. It is possible that the 852 women surveyed are not a fair representation of all reproductive-aged females aged < 25 years. University-educated females may have more insight into the different contraceptive choices and the physiology behind these choices than those without higher education. This is particularly relevant given that half of all the women were undertaking a health sciences degree so they may at least have an interest in understanding contraception. However, given that OCP usage rates were within the range presented in other studies undertaken in Australia [8-10], the results were deemed to be acceptable for this population. Further, demographical data indicated that 21% of all respondents were international students. For this assessment, New Zealand women were grouped together with Australian women, as New Zealand and Australia are considered to be culturally very similar and they have open immigration policies. It is possible that different

cultural groups may be over-represented in this analysis, which may have skewed the data. However, an analysis of the data suggested that no one endpoint was dominated by a particular international country of origin. Further, in 2007, 254,414 international students were enrolled in Australian public universities, representing 26 percent of all students [34]. Thus, the sampling undertaken in the current study appears to be representative of the university student population as a whole.

Recall bias, although somewhat unavoidable with questionnaire-based research, was used in this study to investigate menstrual bleeding frequency and duration of time on hormonal contraceptives. It is possible that these frequencies were over- or under-estimated, and intervention-based studies are suggested to confirm the main findings of this study.

In addition, the words "medically diagnosed" were included in the question about iron deficiency; however, it has been considered that this may have been overlooked or misinterpreted, with respondents recording yes it they felt they had low iron levels rather than if it had been measured by a doctor. The iron deficiency question also included no timeframe and therefore does not necessarily reflect the respondents' current state. Care must be taken when drawing conclusions between current contraceptive practices, and their impact on iron levels.

In conclusion, hormonal contraceptive use in widespread in young university-aged women, and most follow a regular monthly cycle. However, at least 2/3rds of OCP users have skipped menstruation at least once, and 2/3rds of all respondents reported that they would be interested in a contraception that could delay or reduce menstruation. Given the current and possible future contraceptive practices (particularly the use of the extended OCP regimen) in this population, dietary guidelines for iron intake in young female adults may need to be readdressed.

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Table 1: Current hormonal contraceptive usage in women aged 17–25 years

Age	Hormonal Contraceptive Use					Not using hormonal contraception
	OCP	Implant	Inter-Uterine Device	Injection	ALL	
17–20 years	319	11	1	3	334	173
21–25 years	199	5	4	5	213	102
Total	518	16	5	8	567	285

Table 2: Length of time on current hormonal contraceptive in women aged 17–25

	Length of time on current hormonal contraceptive							
	< 1 year		**1–2 years**		**3–5 years**		**> 5 years**	
	n	**%**	***n***	**%**	***n***	**%**	***n***	**%**
17-20 years	88	26.4	128	38.4[a]	102	30.6	15 [b]	4.5
21–25 years	44	20.8	36	17.0	76	35.8	56	26.4
Total	132	24.2	164	30.0	178	32.7	71	13.0

[a,b] $p < 0.0001$ for those aged 17–20 versus those aged 21–25 years

Table 3: Frequency of menstrual blood loss in women aged 17–25

Frequency of menstrual blood loss	**Hormonal contraceptives**		**Not on hormonal contraceptives**	
	%	***n***	**%**	***n***
Every month (average 28-day cycle)	75.6	427	77.4	277
Every month but occasionally every 2 months	13.6	77	15.4	55
Every 2 months	3.7	40	2.5	9
Every 3 months or longer	7.1	40	4.7	17
Total	100	565	100	358