

Adolescent girls in Denmark use oral contraceptives at an increasingly young age, and with more pauses and shifts

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ABSTRACT

INTRODUCTION: Use of hormonal contraceptives for birth control is commonplace in the Western World. In Europe, there is considerable variety in the frequency of use of hormonal contraceptives and in the age at which these contraceptives are initiated. The purpose of the present study was to describe the use of hormonal contraceptives among the Danish adolescent female population, focusing on age, period and cohort effects and including types of hormonal contraceptives.

MATERIAL AND METHODS: All women aged 14-50 years during the 1995-2012 period were identified through the Central Person Register. Furthermore, the National Registry of Medicinal Products Statistics provided information on redeemed prescriptions for hormonal contraceptives characterised by Anatomical-Therapeutic-Chemical (ATC) classification codes.

RESULTS: At the age of 17 years, more than 50% of the Danish adolescent population had redeemed a prescription for hormonal contraceptives. At the age of 20 years, 85% had ever used hormonal contraceptives. This amounts to a significant decrease in age at which hormonal contraceptives were initiated in the younger birth cohorts compared to the older cohorts. Additionally, adolescent girls have more pauses and shifts between types of hormonal contraceptives. Since 2010 there has been a shift toward use of second generation oral contraceptives away from third and fourth generation contraceptives.

CONCLUSION: Adolescent girls tend to initiate their use of oral contraceptives at a younger age than the older cohorts do. Furthermore, they have more pauses and shift between products more frequently than older cohorts. The type of oral contraceptive used has shifted since 2010 towards older products with second generation progestins.

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TRIAL REGISTRATION: The study was approved by the Danish Data Protection Agency (J. No. 2010-41-4778).

start using hormonal contraceptives earlier than women in other European countries [2]. In Denmark, around 140 million defined daily dosages of hormonal contraceptives have been sold annually during the past ten years. It is primarily young women aged 20-24 years who use of oral contraceptives, and the majority of women use third generation oral contraceptives [3, 4]. There is continuous development in the products according to oestrogen dosages and the types of progestins used in the oral contraceptives.

The development of new progestins potentially has different effects and side-effects. In recent years, focus has been on exploring an increased risk of venous thromboembolism associated with newer generations of oral contraceptives with third and fourth generation progestins compared with second generation products [3, 5-8].

The purpose of the present study was to describe the use of hormonal contraceptives among the Danish adolescent female population, focusing on age, period and cohort effects and on types of hormonal contraceptives used.

MATERIAL AND METHODS

All women aged 14-50 years during the 1995-2012 period were identified by their 10-digit personal identification number through the Central Person Register. The National Registry of Medicinal Products Statistics was initiated in 1994 and is complete as from 1995. From the National Registry of Medicinal Products Statistics, relevant Anatomical-Therapeutic-Chemical classification (ATC) codes for hormonal contraceptives were identified for the 1995-2009 period. The following codes were included: G02BA03 G02BB01, G03AB, G03AB03, G03AB04, G03AB05, G03AB06, G03AC01, G03AC02, G03AC03, G03AC08, G03AC09, G03HB01, G03AA01, G03AA03, G03AA05, G03AA07, G03AA09, G03AA10, G03AA11, G03AA12 and G03AA13. From Statistics Denmark, information about finished and ongoing education was collected and updated on an annual basis, and all data relating to each individual person were merged using the 10-digit personal identification number and thereafter made anonymous at Statistics Denmark.

ORIGINAL ARTICLE

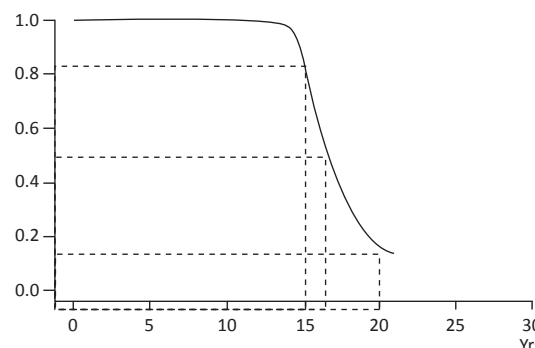
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In Europe, there is considerable variety in the frequency of use of oral contraceptives and in the age at which these are initiated [1, 2]. It has been described that adolescent girls in Scandinavian countries and Germany

FIGURE 1

Hormonal contraceptive-free survival in the 1989-1992 cohorts.



Analyses

Hormonal contraception-free survival curves from 1995 to 2009 for all Danish women born in 1981-1984, 1985-1988 and 1989-1992 were calculated.

A Poisson model comparing the rates in groups was used to establish the rate ratio of hormonal contraception initiation at the age of 14, 15, 16, 17, 18, 19, 20 and 21 years for women born in 1985-1988 and 1989-1992, respectively, compared with those born in 1981-1984.

For women born in 1960, 1965, 1970, 1975 and 1980, respectively, the number of various types of hormonal contraceptives used from 1995 to 2009 was counted and percentage distributions were calculated. Additionally, for these cohorts the numbers of breaks of valid hormonal contraceptive prescription lasting more than four weeks were counted and the percentage distribution was calculated.

The age-standardised percentage distribution of initiation type of hormonal contraception according to a) oestrogen dose or progestin only and b) progestin type in combination with oral contraceptives by education was calculated. Education was categorised as 1) elementary school (duration: 9-10 years) and no ongoing education, 2) high school (12-13 years) and no ongoing education, 3) elementary school and ongoing further education and 4) high school or concluded middle or further education and ongoing education.

The number of adolescents aged 10-14 years and 15-19 years who had redeemed a minimum of one prescription in 2001, 2005, 2009 and 2012 was calculated with hormonal contraceptive exposure grouped according to generations of progestin: first generation: norethisterone acetate; second generation: levonorgestrel or norgestimate; third generation: desogestrel or gestodene; fourth generation: drospirenone and progestogen only pills or hormone intrauterine device (IUD).

TABLE 1

Rate ratio for hormonal contraception initiation in various age groups within various cohorts (the oldest cohort, born 1981-1984, was used as reference) based on a Poisson model including age and an interaction term between age and cohort as explanatory variables.

Age, yrs	Birth year	Rate ratio, estimate (95% confidence interval)
14	1989-1992	1.88 (1.82-1.94)
	1985-1988	1.60 (1.55-1.65)
	1981-1984	1.00 (ref.)
15	1989-1992	1.41 (1.38-1.44)
	1985-1988	1.24 (1.22-1.27)
	1981-1984	1.00 (ref.)
16	1989-1992	1.13 (1.11-1.15)
	1985-1988	1.07 (1.05-1.09)
	1981-1984	1.00 (ref.)
17	1989-1992	0.90 (0.88-0.92)
	1985-1988	1.01 (0.99-1.03)
	1981-1984	1.00 (ref.)
18	1989-1992	0.83 (0.80-0.85)
	1985-1988	0.91 (0.89-0.94)
	1981-1984	1.00 (ref.)
19	1989-1992	0.65 (0.62-0.69)
	1985-1988	0.91 (0.88-0.94)
	1981-1984	1.00 (ref.)
20	1989-1992	0.46 (0.42-0.51)
	1985-1988	0.94 (0.90-0.98)
	1981-1984	1.00 (ref.)
21	1985-1988	0.82 (0.77-0.87)
	1981-1984	1.00 (ref.)

Trial registration: The study was approved by the Danish Data Protection Agency (J. No. 2010-41-4778).

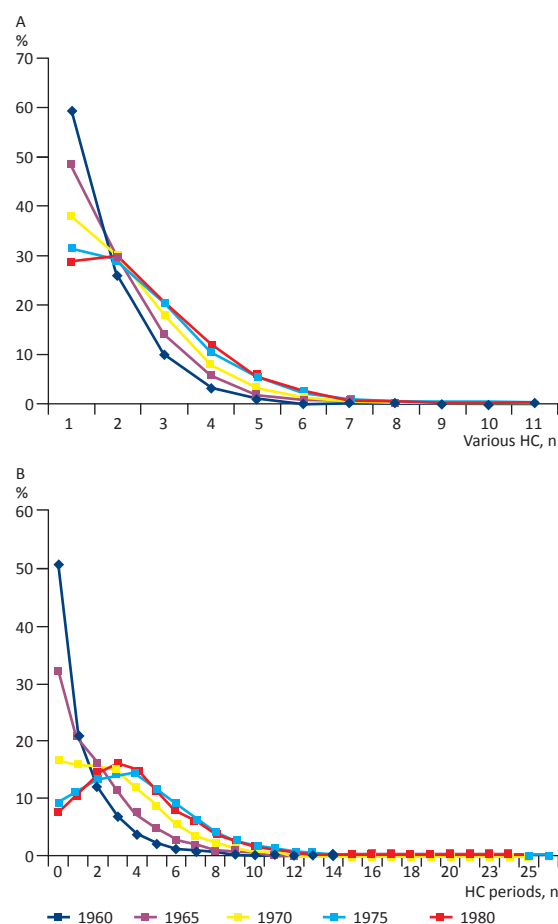
RESULTS

More than 50% of the adolescent female population in Denmark had redeemed a prescription for hormonal contraceptives at the age of 17 years (**Figure 1**). At the age of 20 years, approximately 85% of the female population had been prescribed hormonal contraception. The age at which hormonal contraceptives are initiated declined in the observation period. At the age of 15 years, 8% of the women born in 1981-1984, 13% of the women born in 1985-1988 and 16% of the women born in 1989-1992 had been prescribed hormonal contraceptives.

The rate ratio for initiation of hormonal contraceptives below the age of 17 years was significantly higher for girls born in 1989-92 than for girls born in 1981-1984, as it was 1.88 (95% confidence interval (CI): 1.82-1.94) for initiation at 14 years of age, 1.41 (95% CI: 1.38-1.44) for initiation at 15 years of age and 1.13 (95% CI: 1.11-1.15) for initiation at 16 years of age (**Table 1**). Inversely, the rate ratio for initiation of hormonal contraceptives above the age of 17 years was lower for the youngest cohort than for the oldest cohort (**Table 1**).

FIGURE 2

A. Percentage distribution of the registered number of various types of hormonal contraception (HC) for the 1995–2009 period for women born in 1960, 1965, 1970, 1975 and 1980, respectively. Each cohort sums to 100%. **B.** Percentage distribution of the total number of registered periods of various types of HC separated by more than four-week breaks for women born in 1960, 1965, 1970, 1975 and 1980, respectively. Each cohort sums to 100%.



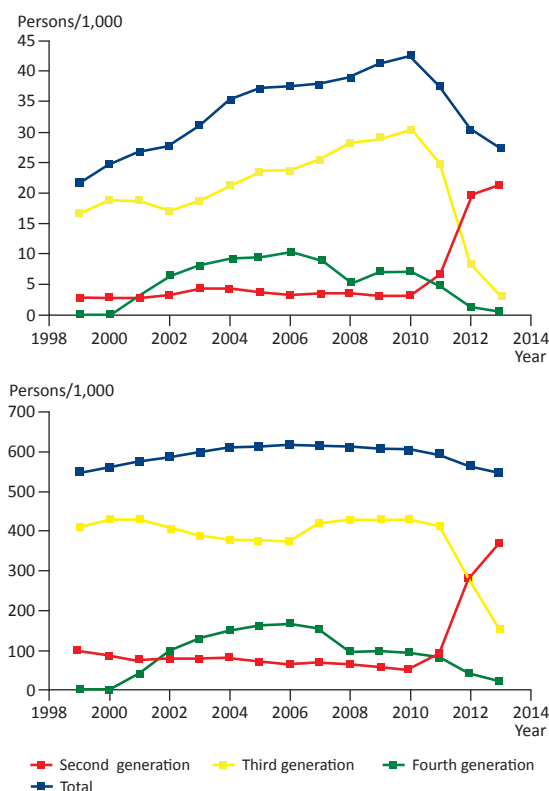
Adolescents use various products more than older women do (**Figure 2A**). Of women born in 1980, 1975, 1970, 1965 and 1960, respectively, 29%, 32%, 38%, 48% and 59% use only on one product (**Figure 2A**). Adolescent girls seem to have more breaks in their use of hormonal contraceptives than older women do (**Figure 2B**).

There was no indication of a different use pattern for oral contraceptive according to level of education, oestrogen dosages or progestin type.

Among adolescents, the type of hormonal contraception used changed during the period. Until 2006, an increase was observed in the proportion of users of fourth generation oral contraceptives; hereafter, a rapid decline was seen (**Figure 3**). For third generation oral contraceptives, an increase was seen until 2010 and hereafter a decrease, whereas an increase in second

FIGURE 3

Number of persons with at least one prescription for hormonal contraceptives within the 1999–2013 period among girls aged 10–14 years (**A**) and among young women aged 14–19 years (**B**). The hormonal contraceptives are divided according to progestin generation in oral contraceptives.



generation oral contraceptives was observed from 2010 (**Figure 3**). The changes occurred first in the youngest adolescents aged 10–14 years. The use of progestin-only products is low, but steadily rising. This trend is more pronounced for the progestin-only pills, but the trend is also seen for hormone IUD; however, only few users are recorded.

DISCUSSION

Hormonal contraceptives are used frequently by Danish adolescent girls, and there is a trend towards a younger age at initiation of hormonal contraceptives.

This finding is in accordance with a study by Cibula [2] in which Scandinavians and Germans had the youngest average starting age for contraceptive usage and the highest proportion of women stating at the age of 16 or younger compared with other European countries. The study was based on interviews with 11,490 Europeans. In South and East European countries, less than 20% take contraceptives before the age of 16 years, and the average age for initiation is between 18 and 20 years [2].

We found that younger women tended to have more pauses and use more different products.

The pattern of use characterised by shift between products and pauses has not previously been addressed in other studies. We found a change in the type of oral contraception used after 2006: first, the use of fourth generation oral combined contraceptives decreased and thereafter also the use of third generation oral contraceptives, whereas use of second generation oral contraceptives increased. This is in accordance with 2007 national media coverage concerning observed cases of venous thromboembolism with the use of fourth generation oral contraceptives with drospirenone and a subsequent publication in 2009 of studies on an increased risk of venous thromboembolism associated with third and fourth generation oral contraceptives [3, 5-8]. These findings made the Danish Institute of Rational Pharmacotherapy recommend the use of second generation oral contraceptives as first choice of drug among young women in 2010. This finding is an example of knowledge translation as national evidence-based recommendations are successfully implemented in clinical practice [9] and, additionally, it is evident that the changes occurred first among the youngest adolescents. We found that the general use of hormonal contraceptives decreased after 2010, which did not affect the number of teenage pregnancies measured by teenage abortions and teenage births as these remained constant. In Denmark, there is a total 2,200 abortions and 438/100,000 births among teenagers annually.

One strength of the present study is that it is based on a national cohort of women in an entire country. A weakness is that we do not know whether the redemption of a prescription corresponds to intake of the prescribed drug.

CONCLUSION

In Denmark, adolescent girls tend to be younger when they start using oral contraceptives. They have more pauses and shifts between products than older women do. In pursuance of national evidence-based recommendations, the type of oral contraception used has shifted since 2010; from third and fourth generation products towards older products with second generations progestins.

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CONFLICTS OF INTEREST: Disclosure forms provided by the authors are available with the full text of this article at www.danmedj.dk

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