Trends in oral contraceptive use in a Southern German population

Results of the MONICA project Augsburg: surveys 1984/85 and 1989/90

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In the surveys of the MONICA project Augsburg, conducted in 1984/85 (S1) and 1989/90 (S2), data on oral contraceptive (OC) use were gathered in two independent representative population-based samples of women aged 25–44 years (medication history over the previous seven days). OCs were categorized according to their oestrogen content (< 50mg, ≥50mg) and according to their progestogen component. The prevalence of OC use was unchanged between the two points in time (23.4% in S1 and 23.7% in S2). OCs with low oestrogen content were used in 49.0% of the OC users in S1 and in 76.6% in S2. The use of the progestogen component changed also: norethindrone (acetate), levonorgestrel, and lynestrenol were used less, desogestrel more often in S2. Gestoden and norgestimate were used by 15% of the OC users in S2. In conclusion, we can say that there was no change in the prevalence of OC use in the study population; however, a change in hormone content towards preparations with lower hormone content was observed.

Key words: oral contraceptives, survey, population-based sample, epidemiology

Oral contraceptives (OC) were approved for use in the Federal Republic of Germany in 1961. The first formulation approved for the US market, in 1960, was Enovid®, which contained 9.85 mg norethynodrel and 150 mg mestranol, in the German market the first was Anovlar®, which contained 4 mg norethindrone acetate and 50 mg ethinyl oestradiol. In the following three decades the type and content of the marketed formulations were changed remarkably, partially under pressure from the public. The reason for these changes were the early warnings from epidemiological studies that serious side effects may occur during OC use (Inman 1970). Both the progestogen and oestrogen content of the pill seem to have an impact on cardiovascular side effects (thromboembolism, myocardial infarction) or enhancement of cardiovascular risk factors like hypertension and hypercholesterolaemia (Inman 1970, Stadel 1981a, 1981b, Mishell 1989, Gerstman 1991, Thorogood 1991). The oestrogen potency was shown to be related directly to the risk of thrombembolism (Inman 1970, Gerstman 1991). The assumption is that formulations with lower oestrogen and progestogen content may be less dangerous and the use of such formulations should be recommended to the public.

The purpose of this paper is to describe the prevalence of OC use in a Southern German population and the change in OC use within five years (from 1984/85 to 1989/90). We will give estimates for use of 'older' formulations with higher hormone content and use of 'newer' formulations with lower hormone content. The used formulations will be categorized according to their oestrogen potency.

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METHODS

The WHO MONICA project

The World Health Organization (WHO) MONICA (MONItoring Trends and Determinants in CArdiovascular Disease) project is designed to analyse trends in cardiovascular mortality, morbidity and case fatality over a 10–year period in defined populations. This requires continuous monitoring of cardiovascular diseases through registers and the periodic assessment of cardiovascular risk factors through population surveys. About 39 centres in more than 20 countries are involved in the project.

Study design of the MONICA Augsburg surveys

The surveys were carried out to assess the frequency of major coronary risk factors. The study area comprises the city of Augsburg and the two surrounding counties. Two independent age-sex stratified two-stage cluster samples of the population (only German Nationals were included), aged 25 to 64 years in 1984/85 survey (S1) and aged 25 to 74 years in 1989/90 survey (S2), were drawn from the population registers (Chambless et al. 1987). In a first step 17 communities were sampled and in a second step in each 10–year-sex group a random sample was drawn. From the 5,312 persons sampled in S1, 5,069 were eligible (non-eligibility was defined by errors in the population registers, deaths, or migration between sampling and examination date); from these persons 4,022 took part in the study (response of 79%). The corresponding

figures for S2, restricted to the same age group (25 to 64 years) were sample size 5,313, 5,163 eligibles and 3,966 participants, reflecting a response of 77%. The examination period was the same in both surveys, lasting from October to May. The examination procedure, identical in both surveys, included a standardized interview, a medical examination including blood pressure readings, venipuncture, recording of an electrocardiogram, sonography of the arteria carotis, and some anthropometric measurements. A detailed description of the measurement procedures of the major cardiovascular risk factors is given elsewhere (Keil et al. 1988).

Study population

The study population of the analyses presented here consists of all women aged 25 to 44 years who participated in the first and second survey of the MONICA Augsburg project. From the 1,328 sampled women of the two age strata 25–34 and 35–44 years, 84 were noneligible. From the remaining 1,246 women, 986 participated in survey 1984/85 (response 79%). In 1989/90, 1,269 women were eligible and 962 took part in the examination (response 75%).

Determination of oral contraceptive use

OC use was determined in both surveys, in the same standardized way, by interview. All drugs taken in the preceding seven days prior the interview were recorded according to the information on the pill boxes or information sheets. If the participants had forgotten to bring this material to the examination centre, a special form was given to them to be filled in at home. For each drug the brand name, form of preparation, daily dose, whether prescribed or not, and whether intake was regular or on demand was recorded. The drugs were coded according to the West German drug coding list 'Rote Liste' (annually updated numerical code list (1984 and 1989)). The list contained 47 OC brands in 1984 and 50 in 1989, from which 35 different brands were used by the study participants in 1984/85 and 33 in 1989/90 (identical brands to which placebo or iron pills are added are not counted).

Different types of oral contraceptives (OCs) were defined in the following way: OCs are all sexual hormone preparations with the indication contraception and one oestrogen/cyproterone acetate preparation with additional indication (Diane®). *Combination pills* are OCs where the oestrogen/progestogen content is unchanged over the whole menstrual cycle. A *phasic pill* is a formulation where the oestrogen/progestogen content is varied over the cycle (usually in three phases). The definition includes sequential pills in which in the first part of the cycle only oestrogen, and in the second part of the cycle an oestrogen/progestogen combination is given. A *minipill* is a formulation which contains only progestogen.

The *oestrogen potency* is categorized: low oestrogen content (< 50 mg) and high oestrogen content (≥ 50 mg). Ethinyl oestradiol and mestranol are treated as equally potent.

In the German market seven different *progestogens* in varying dosages were in use. The progestogens were: lynestrenol; norethindrone; norethindrone acetate; desogestrel; norgestrel and its isomer levonorgestrel; cyproterone acetate; chlormadinone acetate. In 1989/90 two new progestogens were used: gestoden and norgestimate.

Statistical analyses

Data are presented for 5–year age groups. Results for all women, aged 25 to 44 years, are standardized to the age distribution of the population of the Federal Republic of Germany, as of December 31, 1980. For differences in prevalences, 95%-confidence intervals were calculated using normal approximation.

RESULTS

Prevalence of OC use

Prevalence of OC use in the different 5–year age groups are shown in *table 1*. The highest prevalence was found in the youngest age group with 33.2% in 1984/85 and 42.3% in 1989/90. In the two older age groups, prevalences were equal in both surveys; only in the younger age groups could changes be observed. The age-standardized prevalences were virtually unchanged: 23.4% in S1 and 23.7% in S2.

Oestrogen content

The prevalence of use of low oestrogen preparations increased during the observed time period from 49.0% in S1 to 76.6% in S2 (*table 2*). In S1, younger women used low oestrogen preparations more often than did women, aged 40 to 44 years. In S2, the different age groups did not differ remarkably. The prevalence of use of low oestrogen preparations varied between 70% and 82% in the four five–year age groups in S2. A higher percentage of women was using low oestrogen preparations in 1989/90 compared to 1984/85. This observation was consistent across all age groups. The age-standardized, statistically significant difference was about 28% between the two time points.

Progestogen content

The use of the different progestogens had changed between 1984/85 and 1989/90. Norethindrone(acetate), lynestrenol, and levanorgestrel were used less often; deso-

Table 1 Changes in prevalence of oral contraceptive use from survey 1 (1984/85) to survey 2 (1989/90) with confidence interval (CI), by age (women 25–44 years).
MONICA Project Augsburg: Survey 1984/85, Survey 1989/90

Age	Survey 84/85		Survey 89/90		Change	
(years)	N1	%	N2	%	%	95% CI
25–44*	986	23.4	962	23.7	0.3	[–3.3, 4.0]
25–29	223	33.2	265	42.3	9.1	[0.5, 17.7]
30–34	240	30.8	211	21.8	–9.0	[–17.1, –0.9]
35–39	228	21.1	249	21.3	0.2	[–7.1, 7.6]
40–44	295	10.5	237	11.0	0.5	[–4.8, 5.8]

* Age standardized by five–year age groups to the population of the Federal Republic of Germany, December 31, 1980

Table 2 Changes in prevalence of low oestrogen preparations (< 50 mg) in oral contraceptive users from survey 1 (1984/85) to survey 2 (1989/90) with confidence interval (CI), by age.
MONICA Project Augsburg: Survey 1984/85, Survey 1989/90

Age	Survey 84/85		Survey 89/90		Change	
(years)	N1	%	N2	%	%	95% CI
25–44*	227	49.0	237	76.6	27.6	[18.8, 36.3]
25–29	74	51.4	112	82.1	30.8	[17.3, 44.3]
30–34	74	52.7	46	69.6	16.9	[–0.8, 34.5]
35–39	48	47.9	53	77.4	29.4	[11.2, 47.7]
40–44	31	35.5	26	76.9	41.4	[17.7, 65.2]

* Age standardized by 5-year age groups to the population of the Federal Republic of Germany, December 31, 1980

Table 4 Changes in prevalence of phasic preparations' use in oral contraceptive users from survey 1 (1984/85) to survey 2 (1989/90) with confidence interval (CI), by age.
MONICA Project Augsburg: Survey 1984/85, Survey 1989/90

Age	Survey 84/85		Survey 89/90		Change	
(years)	N1	%	N2	%	%	95% CI
25–44*	227	46.4	237	38.0	–8.4	[–17.5, 0.7]
25–29	74	60.8	112	41.1	–19.7	[–34.2, –5.3]
30–34	74	39.2	46	32.6	–6.6	[–24.3, 11.1]
35–39	48	37.5	53	35.9	–1.7	[–20.7, 17.4]
40–44	31	38.7	26	46.2	7.4	[–18.8, 33.6]

* Age standardized by 5-year age groups to the population of the Federal Republic of Germany, December 31, 1980

gestrel more often. The new components gestoden and norgestimate were used by 15% of the OC users in the age group 25 to 44 in S2 *(table 3)*.

Use of phasic preparations

The use of phasic preparations (including sequential pills) decreased in the age group 25 to 39, but the decrease was significant at the 5 per cent level only in the age group 25 to 29 *(table 4)*. Minipills were used by less than 1% of the OC users in both surveys. A trend from phasic preparations to combination products may be present in our population.

DISCUSSION

In the study presented here, trends in the prevalence of OC use between 1984/85 and 1989/90 in a Southern German population were analysed. Prevalences of OC use were virtually the same in women aged 25 to 44 years in both surveys (23% and 24%). In a survey on contraception in five Western European countries Riphagen (1989) reported a prevalence of oral contraceptive or injectables use of 27% in women aged 15 to 44 years in the FRG. This was similar to the prevalence in Great Britain and France but higher than that found in Italy or Spain. Russel-Briefel et al. (1985) found a lower prevalence in the US National Health and Nutrition Examination Survey (NHANES) in 1976–1980 and in 1971–1974. The prevalence reported from these studies were of the same magnitude as that reported by Forrest (1988) for the Ortho Birth Control Study, also conducted in the US, for women aged 18 to 44 years. In the Ortho Birth Control Study an increase from 1982 to 1987 was observed (from 18% to 23%), following a decrease from 1973 to 1982, which was observed in the National Surveys of Family Growth in the US (Bachrach 1984). In contrast to the results of these US surveys, we found no such trend over the comparatively short time period in our population.

Table 3 Use of different progestins in oral contraceptives users, women 25–44 years.
MONICA Project Augsburg: Survey 1984/1985, Survey 1989/90

	Survey 1984/85 n=227	Survey 1989/90 n=236*
Norethindrone	11.9	6.8
Norethindrone acetate	3.5	2.1
Norgestrel	1.3	0.0
Levonorgestrel (D-Norgestrel)	38.3	27.1
Cyproterone acetate	3.1	7.2
Chlormadinone acetate	1.3	3.4
Desogestrel	21.1	28.8
Lynestrenol	19.4	9.3
Gestoden	0.0	7.6
Norgestimate	0.0	7.6

* Information is missing for one preparation

In 1984/85 about 50% of the OC users took preparations with low oestrogen content. This percentage increased remarkably in the following five years up to 77% and reached nearly the level of the United States in 1984, where about 85% of the OC users took low oestrogen preparations (Piper 1987). A study carried out on data based on computerized Medicaid records in 1980 by Van de Carr (1983) observed a higher proportion of high dose estrogen preparations in women aged 15 to 19 years compared to those aged 35 to 39 years in Michigan and in Minnesota. Since high dose preparations (> 50 mg) were used rarely in our population (6 women in S1, 2 women in S2 took pills containing 80–100 mg mestranol), we cannot give reliable estimates for use of high dose preparations in OC users. The proportion of low dose oestrogen preparations (pills containing 30–37.5 mg ethinyl oestradiol; or varying from 30 to 40 (50) mg ethinyl oestradiol in phasic preparations) were similar in all age groups in 1989/90. In 1984/85 however, younger women took low oestrogen dose preparations more often than did older women: about 50% of women aged 25–39 years, and 35% of women aged 40–44 years.

In Augsburg, at the time of both surveys, combination pills were the predominantly used formulations (about 60%). Use of phasic preparations decreased in younger women and increased in older women. The latter trend was not statistically significant. Phasic preparations usually have lower hormone content, but their contraceptive safety depends on correct use. In contrast to our

finding, a higher percentage of OCs (90%) sold in 1984 in the US were combination pills (Piper 1987). It has to be taken into account that 1984 phasic preparations had just entered the US market, and that sequential pills were no longer available on the market there.

The trend towards OCs with lower oestrogen and different progestogen content may be explained by an increasing awareness of safety factors among physicians and women alike. Special concern is given to women over 35 years with additional risk factors, for example, smoking. It is assumed that low-dose preparations are safer than the older preparations with higher hormone content (Mishell 1989), but a final epidemiological evaluation is not yet available. Newer progestogens such as gestoden, discussed extensively since 1988 in the German media, are said to produce the same serious side effects as older types of OCs. A working group at the McGill Pharmacoepidemiology Collaborative Programme issued a statement saying that there is no evidence for increased incidence of thromboembolism among gestoden users (Spitzer 1991).

Other explanations for the observed trend, for example, changes in the medical system, do not explain the trends in OC use over time, since no major changes in the medical practice occurred in the study period. Similarly, there were no differences over time in the prices of the different types of OCs, nor in eligibility for free-of-charge prescriptions.

In conclusion we can say that over time OC prescription practices were changing, and favouring preparations with lower hormone content, and there were no differences in the prevalence of OC use overall. These changes were now pronounced in women over 35 years, who are assumed to benefit most by a reduction in OC hormone content.

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REFERENCES

Bachrach CA (1984). Contraceptive practice among American women, 1973–1982. Fam Plann Perspect 16:253–9.

Chambless L, Cairns V, Herbold M, et al. (1987). MONICA Augsburg Survey sampling. München: GSF-Bericht 31/86.

Forrest JD, Fordyce RR (1988). U.S. women's contraceptive attitudes and practice: how have they changed in the 1980s? Fam Plann Perspect 20:112–8.

Gerstman BB, Piper JM, Tomita DK, Ferguson WJ, Stadel BV, Lundin FE (1991). Oral contraceptive estrogen dose and risk of deep venous thrombembolic disease. Am J Epidemiol 133:32–7.

Inman WH, Vessey MP, Westerholm B, Engelunds A (1970). Thrombembolic disease and the steroidal content of oral contraceptive drugs: a report of the Committee on Safety of Drugs. Br Med J 2:203–9.

Keil U, Stieber J, Döring A, et al. (1988). The cardiovascular risk factor profile in the study area Augsburg: results of the first MONICA survey 1984/85. Acta Med Scand Suppl 728:119–28.

Mishell DR (1989). Contraception. N Engl J Med 320:777–87.

Piper JM, Kennedy DL (1987). Oral contraceptives in the United States: trends in content and potency. Int J Epidemiol 16:215–21.

Riphagen FE, Lehert P (1989). A survey in five west European countries. J Biosoc Sci 21:23–46.

Rote Liste (1984 and 1989). Verzeichnis von Fertigarzneimitteln der Mitglieder des Bundesverbandes der Pharmazeutischen Industrie e.V. Frankfurt.

Russel-Briefel R, Ezzati T, Perlman J (1985). Prevalence of oral contraceptive use in premenopausal females ages 12-54 years: United States 1971-1980. Am J Public Health 75: 1173–6.

Spitzer WO (1991). Die Sicherheit von Gestoden. Deutsches Ärzteblatt 32: B2076–9.

Stadel BV (1981a). Oral contraceptives and cardiovascular disease. First of two parts. N Engl J Med 305:612–7.

Stadel BV (1981b). Oral contraceptives and cardiovascular disease. Second of two parts. N Engl J Med 305:672–7.

Thorogood M, Mann J, Murphy M, Vessey M (1991). Is oral contraceptive use still associated with an increased risk of fatal myocardial infarction? Report of a case-control study. Br J Obstet Gynaecol 98:1245–53.

Van de Carr SW, Kennedy DL, Rosa FW, Anello C, Fones J (1983). Relationship of oral estrogen dose to age. Am J Epidemiol 117:153–8.

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