Health characteristics of women beginning postmenopausal hormone therapy: have they changed since the publication of the Women's Health Initiative?

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Abstract

Objective: After we demonstrated a substantial drop in postmenopausal hormone therapy (HT) in France after 2002, we sought to compare health characteristics assessed before menopause and reasons for beginning treatment among women who started postmenopausal HT before and after this year.

Methods: Among participants of the GAZEL (GAZ and ELectricité) cohort of employees of the French national power company, we studied 1,229 women who reached menopause before 2002 and 562 women who reached menopause after 2002. We analyzed HT use among these newly postmenopausal women before and after 2002 and its relations to self-rated health, simple and troublesome hot flushes, and various other symptoms before menopause.

Results: After 2002, compared with before 2002, women starting HT were more likely to have reported troublesome hot flushes before menopause (odds ratio, 2.3; 95% CI, 1.0-5.4). The groups of new HT users did not differ significantly except for health characteristics. Significantly higher proportions of women starting HT reported using it for hot flushes (68.1% vs 52.9%, $P = 0.02$) and sleep disorders (11.1% vs 2.8%, $P = 0.001$) and a significantly lower proportion of women starting HT reported using it for osteoporosis prevention (12.5% vs 43.9%, $P < 0.001$) after 2002 than before 2002.

Conclusions: After 2002, HT tended to be prescribed for more severe hot flushes, but almost one third of prescriptions were still written for reasons not linked to hot flushes. Doctors seem to be following recommendations to not use HT as a first-line treatment of osteoporosis.

Key Words: Cohort study – Menopause – Hormone therapy.

I n the year after the publication of the results of the Women's Health Initiative (WHI) trial in July 2002,[1] the European Medicines Agency restricted the indications for postmenopausal hormone therapy (HT) to the treatment of cli-

macteric symptoms. It also advised against its use as a first-line treatment of osteoporosis after concluding that risks outweighed benefits for that indication.[2] The guidelines issued in the same year by the French Health Products Safety Agency also limited indications for HT and recommended that its use for treating climacteric symptoms be as brief as possible.[3] These recommendations were reiterated in 2004, 2006, and 2008.[4] From 2002 onward, HT use declined rapidly and substantially in numerous countries, including France.[5,6] We have shown in two French cohorts that the proportion of women starting HT also fell substantially among newly postmenopausal women, a drop accompanied by changes in the types of HT used.[7] However, little is known about whether women starting HT after 2002 have different health characteristics and motivations for using HT from those treated before the publication of the WHI results and the subsequent changes in recommendations by health agencies.

Our main hypothesis was that newly postmenopausal women beginning HT after 2002 were in better general health before beginning treatment than newly postmenopausal women who began HT before that year (ie, because both physicians and postmenopausal women are now aware of the health risks associated with HT, this treatment is administered only to selected healthy women). Our other hypotheses were that, after

2002 compared with the years before, newly postmenopausal women were more often treated for climacteric symptoms (vasomotor symptoms) than for preventive purposes (osteoporosis or cardiovascular health) and that climacteric symptoms now must be more severe than previously for doctors to prescribe HT and for women to agree to take HT.

To explore these hypotheses, we used data from a longitudinal cohort study of French women who were recruited from a general population of working people and followed since 1989, which allowed us to (1) compare, among newly postmenopausal women, the characteristics of women who began treatment before and after 2002, in particular their general health and psychological, osteoarticular, and climacteric symptoms, and (2) analyze the reasons for HT use during these two periods.

METHODS

The GAZEL cohort

Our population is part of the French GAZEL (GAZ and ELectricité) cohort, which began in 1989 and included 15,011 men and 5,614 women who were employed by the French national power company (Électricité de France–Gaz de France) and who volunteered to participate in epidemiological research.[8] Since inclusion, the French Institute for Health and Medical Research (INSERM) unit managing the cohort has mailed a general self-administered questionnaire annually to all members (http://www.gazel.inserm.fr). Within this cohort, a triennial prospective survey ("Women and Their Health" questionnaires) of health around menopause began in 1990: it included all women aged 45 years or older in 1990 and added at each subsequent survey those who had turned 45 since the preceding questionnaire.[9] Participants in this survey were born between 1939 and 1953. They received self-administered questionnaires focusing on women's health issues every 3 years, with questions about menopausal status, symptoms, and use of hormones.

Menopause status and age at menopause

Women were considered naturally postmenopausal if they reported amenorrhea for more than 1 year, unless it was caused by hysterectomy or oophorectomy, or if they had ever used HT and had begun their treatment more than a year earlier, in the absence of such surgical procedure. Women who had had a hysterectomy without oophorectomy before menopause were also considered naturally menopausal if menopause was confirmed by hormone assays. Age at natural menopause was defined as age at the last menstrual period, except when cessation of menstruation was caused by hysterectomy or when HT use preceded the permanent cessation of menstruation. In the case of unknown age at the last menstrual period, the self-reported age at menopause was used instead. When HT use preceded the permanent cessation of menstruation, age at menopause was defined as age at HT start.

HT use

During each period (before and after 2002), "new HT users" included newly postmenopausal women who had begun HT less than 1 year after reaching menopause.[7] HT included any systemic use of estrogens (alone or combined with a progestogen); vaginally administered estrogens were not considered HT in this study.

Population for analysis

This analysis considers women who reached menopause between January 1994 and July 2001 (ie, before the release of the first WHI results in July 2002, with a 1-year gap allowing the identification of new HT users among women with menopause starting no later than July 2001; n = 1,229) and those who reached menopause between August 2002 and December 2007 (ie, after the release of the first WHI results; n = 562). In the following sections, we will refer to these periods as pre-WHI and post-WHI.

Health characteristics
Self-rated health

The annual general questionnaire asked all participants: "How would you judge the state of your general health?" They responded on an eight-point Likert scale (1, very good; 8, very poor), which was dichotomized by categorizing response scores as "basically not good" (highest tertile of the distribution) versus "basically good."

Hot flushes and vaginal dryness

Questions about current hot flushes ("Do you experience hot flushes at the present time? If so, do they bother you?") and current vaginal dryness ("Do you experience vaginal dryness?") were included in the Women and Their Health questionnaires, which were sent every 3 years. Simple hot flushes and troublesome hot flushes[10] were considered separately.

Other symptoms

The Women and Their Health questionnaires also included a list of 12 current symptoms ("Do you regularly suffer from… ?"). We constructed three symptom scores, calculated as the number of symptoms present.[10] The general symptom score (headaches, fatigue, skin dryness, and vertigo) was dichotomized into low (<2) versus high (≥2) scores. The psychological symptom score (irritability, unexplained episodes of sadness, sleep disturbance, unexplained mood changes, and frequent depressive symptoms) was dichotomized into low (<3) versus high (≥3) scores. The osteoarticular symptom score (joint pain, tingling in the limbs, and lumbar or vertebral pain) was dichotomized into low (0) versus high (≥1) scores. If more than two items were missing (one for the osteoarticular symptom score), no score was calculated for that set of symptoms.

For all health characteristics, the last-value-carried-forward technique was applied to replace missing values.

Covariates

Educational level, occupational grade, and monthly household income were obtained from the initial 1989 general questionnaire. Marital status, number of children, body mass index based on self-reported weight and height, smoking, alcohol consumption, retirement, and any major life events during the past year were obtained from the annual general questionnaires. Data on

past oral contraceptive use and physical exercise were collected only once and were obtained from the Women and Their Health inclusion questionnaire. Table 1 reports the categories used for covariates.

Possible reasons for starting HT, which were self-reported in the Women and Their Health questionnaires, included hot flushes, general prevention (ie, "disorders related to menopause and premenopause") and osteoporosis prevention, vaginal dryness, lack of energy, sleep disorders, and aches/stiffness in joints. Women were also asked if they used HT because they personally chose to or because their physician decided they should. They could answer "both."

Statistical analysis

First, χ^2 tests were computed to compare all postmenopausal women in each period (pre-WHI and post-WHI) for social, lifestyle, and health characteristics last assessed before the date menopause began. New HT users in each period were also compared for health characteristics before menopause.

Successfully meeting our first aim (ie, analyzing the differences among newly postmenopausal women in relation to the health characteristics of those who began HT before and after 2002) required that we verify these differences as existing only among the new HT users and not among all newly postmenopausal women. Accordingly, we constructed two regression models for each health characteristic with a significantly different distribution between pre-WHI and post-WHI new HT users: the health characteristic in question as the dependent variable and a set of independent variables including the period (pre-WHI or post-WHI). The first model was constructed in the new HT users group, and the second model was constructed among the other women (ie, newly postmenopausal non-HT users). We used a period-HT test for interaction to test whether the period effect differed between new HT users and the other women. Independent variables included age, period, and the social and lifestyle characteristics that were associated with the relevant health characteristics ($P < 0.20$ in both univariate and multivariable models).

Finally, the reasons for using HT among new HT users were compared between women in each group using independent-sample Pearson's χ^2 tests.

Values for covariates and health characteristics were those reported in the last available questionnaire preceding menopause.

The level of significance was set at $P \leq 0.05$. Statistical analysis was performed with Stata (version 11) software for Windows.

RESULTS

Characteristics of all newly postmenopausal women before and after the WHI

Overall, 1,229 cohort members reached menopause in the pre-WHI period, and 562 cohort members reached menopause in the post-WHI period. The latter had higher educational levels, reported lower household incomes, and were more likely to be smokers, to do physical exercise, to have two or more children, and to have used oral contraception than those who reached menopause in the pre-WHI period (Table 1). They were also more likely to be retired and were significantly younger at retirement than those who reached menopause in the pre-WHI period (52.6 [5.2] vs 55.1 [3.3] y, $P < 0.001$). A comparison of the health characteristics of all postmenopausal women showed that those who reached menopause in the post-WHI period reported better self-rated health, were more likely to report simple hot flushes, and were more likely to experience more than two psychological symptoms than those who reached menopause in the pre-WHI period. No significant differences were observed for troublesome hot flushes, vaginal dryness, number of general symptoms, or number of osteoarticular symptoms between the two periods (Table 1).

Characteristics of new HT users before and after the WHI

In the pre-WHI period, 652 newly postmenopausal women (53.1%) began HT less than 1 year after reaching menopause, and 577 did not. Among the 562 women who reached menopause in the post-WHI period, only 72 were new HT users (12.8%). A comparison of health characteristics assessed before menopause for women starting HT during the two periods (Table 2) showed essentially the same differences as those previously observed for all newly postmenopausal women between the two periods, except for troublesome hot flushes and psychological symptoms. Specifically, whereas the frequency of troublesome hot flushes did not differ significantly between the pre-WHI and post-WHI periods among all postmenopausal women, troublesome hot flushes were significantly more frequent in women who started HT in the post-WHI period than in women who started HT in the pre-WHI period (12.9% vs 5.8%, $P = 0.02$). Psychological symptoms were more frequent in the post-WHI period than in the pre-WHI period, and that difference was more pronounced among new HT users, of whom 41.7% experienced more than two psychological symptoms before menopause in the post-WHI period versus 27.7% in the pre-WHI period ($P = 0.01$).

Multivariable comparison of trends in the characteristics of women who did and did not start HT

We conducted multivariable analyses of health characteristics with significantly different distributions for pre-WHI and post-WHI new HT users (ie, simple and troublesome hot flushes, self-rated health, and psychological symptoms).

After we took into account the characteristics associated with simple hot flushes before menopause, we found these symptoms to be more frequent in the post-WHI period than in the pre-WHI period, both among new HT users (odds ratio [OR], 1.9; 95% CI, 1.2-3.3) and the other women (OR, 1.5; 95% CI, 1.2-2.0; interaction test between HT initiation and period, $P = 0.51$; Table 3). Results of the multivariable analysis of troublesome hot flushes confirmed the differences previously seen among new HT users, who were more likely to report these symptoms before menopause in the post-WHI period than in the pre-WHI period (OR, 2.3; 95% CI, 1.0-5.4), whereas no difference was observed among HT nonusers (OR, 0.9; 95% CI, 0.5-1.6; interaction test between HT initiation and period, $P = 0.04$; Table 3).

TABLE 1. *Social, lifestyle, and health characteristics of newly postmenopausal women in the pre-WHI and post-WHI periods*

	Pre-WHI (n = 1,229)	Post-WHI (n = 562)	P
Year of birth			a
1939-1941	97 (7.9)	0 (0)	
1942-1944	281 (22.9)	1 (0.2)	
1945-1947	497 (40.4)	28 (5.0)	
1948-1950	280 (22.8)	159 (28.3)	
1951-1953	74 (6.0)	374 (66.5)	
Educational level			<0.001
Less than baccalaureate	972 (81.1)	355 (64.0)	
Baccalaureate or higher	226 (18.9)	200 (36.0)	
Monthly household income			<0.001
≤€1,600	242 (20.7)	104 (19.2)	
€1,601-2,599	488 (41.8)	283 (52.3)	
≥€2,600	438 (37.5)	154 (28.5)	
Contraceptive pill			<0.001
Never use	250 (20.4)	63 (11.2)	
Ever use	978 (79.6)	499 (88.8)	
Parity			0.003
0 or 1 child	448 (36.5)	165 (29.4)	
≥2 children	781 (63.5)	397 (70.6)	
Body mass index[b]			NS
<25 kg/m^2	833 (67.8)	390 (69.4)	
≥25 kg/m^2	396 (32.2)	172 (30.6)	
Physical exercise			0.05
Never or occasionally	743 (60.5)	312 (55.5)	
At least once a week	486 (39.5)	250 (44.5)	
Smoker[b]			0.05
No	1,065 (86.7)	467 (83.1)	
Yes	164 (13.3)	95 (16.9)	
Lives with a partner[b]			NS
No	274 (23.6)	125 (23.1)	
Yes	887 (76.4)	416 (76.9)	
Retired[b]			<0.001
No	1,096 (89.2)	407 (72.4)	
Yes	133 (10.8)	155 (27.6)	
Occupational grade			0.001
Management or training personnel	318 (28.6)	194 (36.6)	
First-line supervisor or sales representative	699 (62.9)	284 (53.6)	
Blue-collar and clerical staff	94 (8.5)	52 (9.8)	
Alcohol consumption[b]			NS
0-6 drinks/wk	978 (79.6)	440 (78.3)	
≥7 drinks/wk	251 (20.4)	122 (21.7)	
Major life event (divorce/separation or death of someone close)[b]			NS
No	841 (78.2)	379 (77.0)	
Yes	235 (21.8)	113 (23.0)	
Self-rated health[b]			<0.001
Basically good	927 (75.4)	476 (84.7)	
Basically not good	302 (24.6)	86 (15.3)	
Simple hot flushes[b]			0.001
No	794 (68.2)	326 (59.7)	
Yes	370 (31.8)	220 (40.3)	
Troublesome hot flushes[b]			NS
No	1,111 (94.2)	507 (93.2)	
Yes	68 (5.8)	37 (6.8)	
Vaginal dryness[b]			NS
No	846 (75.5)	396 (76.2)	
Yes	275 (24.5)	124 (23.8)	
Number of general symptoms[b]			NS
≤1	713 (58.5)	354 (63.2)	
>1	506 (41.5)	206 (36.8)	
Number of psychological symptoms[b]			0.004
≤2	869 (71.4)	362 (64.6)	
>2	348 (28.6)	198 (35.4)	
Number of osteoarticular symptoms[b]			NS
None	315 (25.9)	138 (24.6)	
≥1	902 (74.1)	422 (75.4)	

Data are presented as n (%).
WHI, Women's Health Initiative; NS, nonsignificant (P > 0.05).
[a]Because of the design of our study, birth dates differed between the pre-WHI group and the post-WHI group, and the P value was not calculated.
[b]Last measurement before menopause.

TABLE 2. *Health characteristics[a] of women starting HT in the pre-WHI and post-WHI periods*

	New HT users		
	Pre-WHI (n = 652)	Post-WHI (n = 72)	P
Self-rated health			0.008
Basically good	499 (76.5)	65 (90.3)	
Basically not good	153 (23.5)	7 (9.7)	
Simple hot flushes			0.03
No	417 (67.6)	38 (54.3)	
Yes	200 (32.4)	32 (45.7)	
Troublesome hot flushes			0.02
No	587 (94.2)	61 (87.1)	
Yes	36 (5.8)	9 (12.9)	
Vaginal dryness			NS
No	444 (75.3)	49 (74.2)	
Yes	146 (24.7)	17 (25.8)	
Number of general symptoms			NS
≤1	369 (56.7)	40 (55.6)	
>1	282 (43.3)	32 (44.4)	
Number of psychological symptoms			0.01
≤2	469 (72.3)	42 (58.3)	
>2	180 (27.7)	30 (41.7)	
Number of osteoarticular symptoms			NS
None	170 (26.2)	17 (23.6)	
≥1	479 (73.8)	55 (76.4)	

Data are presented as n (%).
HT, hormone therapy; WHI, Women's Health Initiative; NS, nonsignificant ($P > 0.05$).
[a]Last measurement before menopause.

Multivariable analysis confirmed that new HT users were less likely to report poor self-rated health before menopause in the post-WHI period than in the pre-WHI period (OR, 0.4; 95% CI, 0.2-1.0). The same result was true for the other women (OR, 0.6; 95% CI, 0.4-0.8; Table 4), and the ORs did not differ significantly (interaction test, $P = 0.45$).

Multivariable analysis of psychological symptoms showed that new HT users were more likely to report more than two symptoms before menopause in the post-WHI period than in the pre-WHI period (OR, 1.8; 95% CI, 1.0-3.0), whereas the

TABLE 3. *ORs for simple and troublesome hot flushes before menopause associated with the pre-WHI and post-WHI periods*

	OR adjusted for age (95% CI)	Fully adjusted OR (95% CI)
Simple hot flushes		
Among new HT users		
Pre-WHI	1.0 (ref)	1.0 (ref)
Post-WHI	1.7 (1.0-2.8)	1.9 (1.2-3.3)[a]
Among HT nonusers		
Pre-WHI	1.0 (ref)	1.0 (ref)
Post-WHI	1.5 (1.1-1.9)	1.5 (1.2-2.0)[a]
Troublesome hot flushes		
Among new HT users		
Pre-WHI	1.0 (ref)	1.0 (ref)
Post-WHI	2.2 (1.0-4.8)	2.3 (1.0-5.4)[b]
Among HT nonusers		
Pre-WHI	1.0 (ref)	1.0 (ref)
Post-WHI	0.9 (0.5-1.5)	0.9 (0.5-1.6)[b]

OR, odds ratio; WHI, Women's Health Initiative; HT, hormone therapy; ref, referent.
[a]Adjusted for age, body mass index (<25 or ≥25 kg/m^2), parity (0 or 1 child, or ≥2 children), and retirement (yes or no).
[b]Adjusted for age, body mass index (<25 or ≥25 kg/m^2), parity (0 or 1 child, or ≥2 children), smoking (yes or no), retirement (yes or no), and educational level (less than baccalaureate or baccalaureate or higher).

TABLE 4. *ORs for basically not good self-rated health and more than two psychological symptoms before menopause associated with the pre-WHI and post-WHI periods*

Period	OR adjusted for age (95% CI)	Fully adjusted OR (95% CI)
Basically not good self-rated health		
Among new HT users		
Pre-WHI	1.0 (ref)	1.0 (ref)
Post-WHI	0.4 (0.2-0.8)	0.4 (0.2-1.0)[a]
Among HT nonusers		
Pre-WHI	1.0 (ref)	1.0 (ref)
Post-WHI	0.6 (0.4-0.8)	0.6 (0.4-0.8)[a]
More than two psychological symptoms		
Among new HT users		
Pre-WHI	1.0 (ref)	1.0 (ref)
Post-WHI	1.8 (1.1-2.9)	1.8 (1.0-3.0)[b]
Among HT nonusers		
Pre-WHI	1.0 (ref)	1.0 (ref)
Post-WHI	1.2 (0.9-1.6)	1.2 (0.9-1.7)[b]

OR, odds ratio; WHI, Women's Health Initiative; HT, hormone therapy; ref, referent.
[a]Adjusted for age, body mass index (<25 or ≥25 kg/m^2), physical exercise (never or occasionally, or at least once a week), retirement (yes or no), and alcohol consumption (0-6 drinks/wk or ≥7 drinks/wk).
[b]Adjusted for age, occupational grade, and retirement (yes or no).

difference was less marked among HT nonusers (OR, 1.2; 95% CI, 0.9-1.7). However, the interaction test between HT initiation and period did not reach statistical significance ($P = 0.27$; Table 4).

Reasons for HT use

Reasons for HT use differed in the two periods: in the post-WHI period, a higher proportion of women reported using HT because of hot flushes (68.1% vs 52.9%, $P = 0.02$) and sleep disorders (11.1% vs 2.8%, $P = 0.001$), and a clearly lower proportion of women reported using HT for general prevention (5.6% vs 24.1%, $P = 0.001$) and osteoporosis prevention (12.5% vs 43.9%, $P < 0.001$; Table 5). Before the WHI publication, nearly half of women starting HT (47%) did not report hot flushes as a reason for using HT—a proportion that dropped to less than one third (32%) afterward (Table 5). HT use was a personal choice for 28% of new HT users before 2002 and for 30% of new HT users after 2002, and was the doctor's choice for 57% of new HT users before 2002 versus 53% of new HT users after 2002 (proportions do not differ significantly between the two periods; data not shown).

DISCUSSION

Our study confirms the strong drop in HT use after 2002 among newly postmenopausal women. However, we found that the health characteristics associated with beginning HT did not change much between the two periods. Indeed, women starting HT in the post-WHI period were in better general health and had more often experienced simple hot flushes before menopause than those starting HT in the pre-WHI period, but this was also the case for women who did not begin HT use. The frequency of vaginal dryness, as well as the number of general, psychological, and osteoarticular symptoms before menopause, did not differ significantly between women beginning HT use during the two periods. The only

	New HT users		
	Pre-WHI (n = 652)	Post-WHI (n = 72)	P^a
Hot flushes	345 (52.9)	49 (68.1)	0.02
General prevention	157 (24.1)	4 (5.6)	0.001
Osteoporosis prevention	286 (43.9)	9 (12.5)	<0.001
Sleep disorders	18 (2.8)	8 (11.1)	0.001
Vaginal dryness	42 (6.4)	6 (8.3)	0.49
Lack of energy	25 (3.8)	4 (5.6)	0.34
Aches/stiffness in joints	11 (1.7)	1 (1.4)	0.85

Data are presented as n (%).
HT, hormone therapy; WHI, Women's Health Initiative.
^{a}Age-adjusted.

symptom that became more frequent only among new HT users in the later period was troublesome hot flushes experienced before menopause. In contrast, self-reported reasons for using HT have changed markedly between the two periods, with a strong decrease in reasons related to prevention of osteoporosis and an increase in reasons related to hot flushes. Nonetheless, after 2002, around 32% of HT initiators still started it for a reason other than hot flushes.

One of the strengths of our study is its longitudinal design. It allowed us to analyze health indicators measured before menopause (ie, before any HT use that could have modified them). Another strength is the variety of data collected from the GAZEL cohort, which allowed us to adjust our analyses for social, demographic, and lifestyle characteristics that are potentially linked to the health characteristics we were interested in.

Because the characteristics of newly postmenopausal women—whether or not they began HT use—might have changed between the pre-WHI period and the post-WHI period, it was not sufficient to evaluate whether the characteristics of women starting HT had changed between the two periods. We also had to determine whether the changes observed among this group differed from those observed among all postmenopausal women. In particular, we observed that women who reached menopause in the post-WHI versus pre-WHI periods were more highly educated and more likely to both have used oral contraceptives and be retired. This difference is probably explained by a birth cohort effect because our pre-WHI group is naturally composed of women from older generations than those in the post-WHI group. Moreover, the previous observation that retirement had a positive influence on self-rated health in the GAZEL cohort may explain, at least in part, the better self-rated health among the newly postmenopausal women in the post-WHI period.[11] The elevated proportion of retired women and their younger age at retirement in the post-WHI group may also explain why their average household income was lower.

The collection of information on health indicators other than self-rated health only every 3 years is a limitation of our study. In particular, some women may have been misclassified as not having had hot flushes before menopause when hot flushes appeared between the last completed Women and Their Health questionnaire and the onset of menopause. This nondifferential misclassification bias may have diluted a potential change concerning hot flushes as a determinant of HT use between the pre-WHI period and the post-WHI period. Furthermore, the relatively low number of women beginning HT in the post-WHI period may have limited our power to detect significant differences between the two periods.

Despite the wide publicity that the WHI results received, it is not certain that they had an immediate impact on doctors' prescribing habits and women's perceptions of HT. Accordingly, we performed a sensitivity analysis that more clearly differentiated the post-WHI period from the pre-WHI period, excluding women who reached menopause in the early post-WHI phase (ie, from August 2002 through the end of December 2003). This analysis produced point estimates that were very close to those obtained when our cutoff date was set at August 2002, but were less precise, as around one third of the women in the post-WHI group were no longer included.

Our findings concerning the reduction in HT use after 2002 are consistent with the results of many other studies of various designs in several countries.[12-14]

When comparing the pre-WHI and post-WHI periods, we found no differential variation in the frequency of simple hot flushes between new HT users and other women. This result surprised us because after 2002, health authorities limited the first-line indications for HT to the treatment of climacteric symptoms. Hot flushes should therefore have become a stronger determinant of HT use. The results concerning troublesome hot flushes, however, suggest that a change did occur: we found that newly postmenopausal women treated in the post-WHI period were more likely than those treated in the pre-WHI period to have had troublesome hot flushes before beginning HT use. The explanation for this result probably lies in the need for a stronger motivation to use HT after the publication of the WHI; symptoms had to be more severe, as we hypothesized. In line with this observation, the self-reported reasons for using HT have evolved, with hot flushes and sleep disorders (which can be attributed to night sweats) cited more often in the post-WHI period than in the pre-WHI period. Our results about the higher frequency of psychological symptoms among newly postmenopausal women treated in the post-WHI period compared with the pre-WHI period (less marked, although not significantly so, among all women) are also in line with that interpretation. They may indeed indicate that hot flushes would need to be more severe (ie, have repercussions on sleep and/or mood) for HT to be initiated. These results should also be related to those of studies centered on predictors of HT discontinuation that were conducted between 1994 and 1999; they suggested that some physicians may prescribe HT in place of or in addition to antidepressants to alleviate depressed feelings.[15] In Québec, analyses from databases showed that some comedications (ie, antidepressant and anxiolytic agents) were more frequent among new HT users in the post-WHI period (13.3% vs 18.2%, $P < 0.0001$ for antidepressants; 28.9% vs 31.4%, $P = 0.088$ for anxiolytics).[16] These results suggest that such drugs may sometimes be prescribed for psychological or physical symptoms (or both) previously managed with HT.

To our knowledge, few studies have analyzed differences in the health characteristics of women starting HT before and after 2002. Guay et al[16] analyzed the impact of the publication of the WHI trial on the clinical characteristics of new HT users; they reported no change in the proportion of women with risk factors for cardiovascular disease or at very high risk for coronary heart disease. In an observational cohort of more than 169,500 women aged 40 to 80 years from five US health maintenance organizations, Newton et al[17] failed to find any comorbidity (ie, fracture, diabetes, or cardiovascular disease)—identified with a score constructed from pharmacy data—that was associated with the observed decrease in the prevalence of new HT use in the early months after the 2002 release of the WHI.

In line with these results, we did not find women starting HT in the post-WHI period to be in better general health than new HT users in the pre-WHI period, whether we considered self-rated health or the general symptom score. Contrary to our hypothesis, it seems that after 2002, HT was not more likely to be used by selected healthy women. The most important factor in the physicians' decision to prescribe HT may be their convictions about the benefits and risks of this treatment, rather than the women's individual health patterns. Women's convictions may also play a role, but we found that the decision to use HT was more likely to be made by the physician than by the woman.

Our results about the changes in reasons for using HT are consistent with those of surveys among physicians: after the WHI, prevention of osteoporosis became a less frequent reason to prescribe HT among gynecologists in Sao Paulo (90.2% before the WHI vs 74.9% after the WHI, $P < 0.0001$).[18] A similar decrease was reported among German gynecologists.[19] In a qualitative survey among family practitioners (Washington state), physicians no longer recommended HT for prevention of osteoporosis.[20] That survey found that many physicians felt that women should make the decision about HT. However, in our study, only one third of new HT users reported that HT use was a personal choice, and this proportion did not change across time.

CONCLUSIONS

In our cohort, the health characteristics of newly postmenopausal women changed similarly between the pre-WHI period and the post-WHI period among women who started HT and those who did not, with the exception of troublesome hot flushes and (although not significantly so) psychological symptoms. During the two periods, physicians, rather than women, mainly made the decision about HT. These factors imply that the substantially greater selectivity in prescribing HT was independent of women's health characteristics, contrary to what we expected. Although our results suggest that hot flushes had to be more severe for HT to be prescribed in the post-WHI period, almost one third of prescriptions were still written for reasons not linked to hot flushes. On the other hand, the recommendation that HT not be used as a first-line treatment of osteoporosis seems to have been taken into account because osteoporosis prevention became a far less frequent reason for HT use in the post-WHI period.

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