

Long-term effects of hormone therapy on skin rigidity and wrinkles

Erin F. Wolff, M.D.,^a Deepak Narayan, M.D.,^b and Hugh S. Taylor, M.D.^a

^aDepartments of Obstetrics, Gynecology, and Reproductive Sciences and ^bPlastic Surgery, Yale University School of Medicine, New Haven, Connecticut

Objective: To evaluate the effects of long-term hormone therapy (HT) on skin rigidity and wrinkling.

Design: Single blinded cross-sectional analysis.

Setting: Academic medical center.

Patient(s): Sixty-five long-term HT users who underwent menopause at least 5 years before evaluation and who have either consistently used HT or have never used HT.

Intervention(s): Visual assessment of severity of wrinkles at 11 facial locations using the Lemperle scale by a plastic surgeon blinded to HT use. Measurement of skin rigidity at the cheek and forehead with a durometer.

Main Outcome Measure(s): Lemperle wrinkle score and skin rigidity.

Result(s): Twenty women met inclusion criteria. Eleven women who had not used HT were compared to nine long-term HT users. Demographics including age, race, sun exposure, sunscreen use, tobacco use, and skin type were similar. Rigidity was significantly decreased in HT users compared to nonusers at both the cheek (1.1 vs. 2.7) and forehead (20 vs. 29). Average wrinkle scores were lower in hormone users than in nonhormone users (1.5 vs. 2.2).

Conclusion(s): Long-term postmenopausal HT users have more elastic skin and less severe wrinkling than women who never used HT, suggesting that hormone therapy may have cosmetic benefits. (*Fertil Steril*® 2005;84:285–8. ©2005 by American Society for Reproductive Medicine.)

Key Words: Hormone replacement therapy, skin, wrinkles, skin aging, durometer

Controversy has surrounded postmenopausal hormone therapy (HT) in the wake of the Women's Health Initiative (WHI), in which the estrogen/P arm was prematurely halted after reaching a predetermined boundary for breast cancer in the fifth year of the study, and the global index statistic supported risks exceeding benefits. Analysis of the available data showed an increased incidence of cardiovascular events, stroke, deep venous thrombosis (DVT), and pulmonary embolism (PE) in the estrogen–progestin arm compared to placebo. Recent attention has focused on the increased risks associated with treatment. However, potential benefits on the skin are often overlooked. The skin is the largest organ in the body and is known to be impacted by estrogen status (1). Estrogen significantly increases skin thickness, capillary blood flow, collagen content, hydrophilic glycoaminoglycans, and water content in postmenopausal women treated with estrogen or combined HT compared to those who were not treated (2–11). Not only do these effects have aesthetic

implications, but also implications on serious health considerations including pressure ulcers and venous leg ulcers (12) and skin integrity of the genitourinary tract (13). The effects on dermatologic health are important to consider in a comprehensive risk–benefit assessment of HT and should be included in discussions between a physician and patient.

Estrogen therapy has been associated with decreased aging and wrinkling of the skin. Creidi et al. (3) demonstrated the short-term effects of topical estrogen in a blinded study; however, no study to date has evaluated the long-term effects of oral HT on skin wrinkling in a blinded fashion. We have demonstrated two novel and objective ways to measure skin changes associated with aging in menopausal women: Lemperle's wrinkle scoring system (4) and the durometer. These two methods of assessing skin aging offer many advantages over those previously studied. Modalities previously used to assess skin aging include dermal thickness, water content, collagen content, blood flow, and elasticity. However, studying wrinkles directly has the benefit of addressing the most obvious and tangible concern of most patients. Lemperle's wrinkle scoring system possesses several characteristics that are attractive in a research setting. First, it is

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Reprint requests: Hugh S. Taylor, M.D., Division of Reproductive Endocrinology and Infertility, Department of Obstetrics, Gynecology and Reproductive Sciences, Yale University School of Medicine, 333 Cedar Street, New Haven, Connecticut 06520 (FAX: 203-785-7134; E-mail: hugh.taylor@yale.edu).

TABLE 1

Patient characteristics.			
	HT (mean)	Non-HT (mean)	P value
Age	55.7	59.6	NS
Age at menopause	49.1	49.8	NS
Yrs since menopause	6.6	9.6	NS
Skin type (1–5)	3.1	2.8	NS
Sunscreen (1-always, 6 never)	4.3	3.9	NS

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an objective scoring system that has photographic examples of each gradation of wrinkles at 11 facial locations. A patient's wrinkles are easily scored by directly comparing the patient to the published photographic examples of the different grades of wrinkles. It is a rapid, easy, noninvasive, and reproducible way of assessing skin aging. Similarly, the durometer is also an objective, quick, and noninvasive way of assessing skin, and is not limited by interpersonal differences in subcutaneous fat content.

MATERIALS AND METHODS

This was a single blinded, cross-sectional study of the effects of HT on skin wrinkles and elasticity in postmenopausal women. The study was conducted in an academic university medical center. The study protocol was approved by the Yale University School of Medicine Human Investigation Committee. All study participants provided written informed consent before enrollment.

Sixty-five women responding to solicitations for volunteers throughout the hospital were screened at Yale-New Haven Hospital. Postmenopausal women were eligible if they were amenorrheic either naturally or surgically (with bilateral oophorectomy) for at least 5 years. Two groups of patients were enrolled, those that had used HT continuously from within 1 year of their last menstrual period (LMP) to the time of this study, and those who had never used HT since menopause. Patients taking androgens, long-term topical or systemic steroids, or retinoids were excluded from this study. Patients with a history of facial plastic surgery, scleroderma, known collagen disorders, facial trauma, or dermabrasion were also excluded.

After eligibility for the study was confirmed, patients were asked to fill out a questionnaire that included age, hormone therapy taken (if any), number of years on HT, age at menopause, race, sunscreen use, and tobacco use. Patients were then examined by a plastic surgeon blinded to use of HT. Skin type was assigned based on pigmentation and propensity to burning when exposed to sunlight on a scale of 1 (fair skin/burns easily/does not tan) to 5

(dark/never burns/tans easily). This scale accounts for racial differences in skin pigmentation by assessing the degree of pigmentation directly. Wrinkling was assessed at 11 facial locations as described by Lemperle et al. (6): horizontal forehead lines, glabellar frowns, cheek folds, preauricular lines, periorbital lines, nasolabial folds, upper lip lines, corner of mouth lines, marionette lines, chin crease, and neck folds. Wrinkles were scored on a scale from 0 (minimal/no evidence of wrinkles) to 5 (severe wrinkles). Wrinkling at each location, as well as average wrinkle scores in each group were compared by Mann-Whitney rank sum test. Skin rigidity was assessed at the forehead and cheek using a durometer (Acor Orthopaedic, Inc., Cleveland, OH) according to the manufacturer's protocol. Skin rigidity was compared between the two groups using Student's *t*-test.

RESULTS

Sixty-five women were screened, from which 20 women who met entry criteria were enrolled. We excluded women who did not meet our stated inclusion criteria and those who met exclusion criteria. Most exclusions were due to patients being postmenopausal <5 years or to lack of consistent use or nonuse of HT. Eleven women who had not used HT were compared to nine long-term HT users. All 20 completed the full evaluation. Demographics including age, race, tobacco use, sun exposure, sunscreen use, and skin type were similar between the two groups (Table 1).

The Lemperle wrinkle scores were lower in the HT group in 6 of 11 locations, and equal in three locations (Table 2). The following measurements of Lemperle wrinkle scores were lower in the HT users: glabellar frowns, cheek folds, periauricular lines, periorbital lines, marionette lines, and neck folds. The wrinkle scores at each of the 11 individual

TABLE 2

Wrinkle scores (average Lemperle score).			
	HT	Non-HT	P value
Horizontal forehead	1	1	NS
Glabellar frowns	1	2.2	NS
Cheek folds	1.5	2.1	NS
Preauricular lines	1.7	2.5	NS
Periorbital lines	2.1	2.3	NS
Nasolabial folds	3	2	NS
Upper lip lines	2	1	NS
Corner of mouth lines	3	3	NS
Marionette lines	1.3	2.7	NS
Chin crease	2	2	NS
Neck folds	3.2	4	NS
Average score	1.5	2.2	<i>P</i> <.05

Note: NS = not significant.

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