Katharina Dorothea Dalton (1916–2004) [1]

By: Zietal, Bianca Keywords: Katharina Dalton [2]

Katharina Dorothea Dalton was a physician in England in the twentieth century who defined premenstrual syndrome (PMS) as a cluster of symptoms suspected to begin one to two weeks before menstruation [3] and disappear upon the onset of a new menstrual cycle. Prior to Dalton, there was little research on pre-menstrual issues and those that existed linked the problem to excessive water retention or estrogen [4]. Dalton hypothesized that PMS resulted from a deficiency in the hormone [5] progesterone [6] and advocated for hormone [5] replacement therapy to lessen the symptoms of the syndrome. Dalton established an early PMS clinic in London, England, and she testified on behalf of women in over fifty court cases claiming to have committed crimes while suffering from PMS.

Katharina Dorothea Dalton was born in London, England, on 12 November 1916. She was the second of five children born to Anna Knoester and Johannes Kuipers. Dalton's father, a merchant and freemason, died when she was young. Despite reduced finances, Dalton attended the Royal Masonic School for Girls in London. As a child, Dalton planned to study general medicine. However, after winning a scholarship, she instead attended the London Foot Hospital of Chiropody, in London. In 1936, she earned a post-secondary degree in chiropody, also called podiatry or the study of legs and feet. For the next ten years Dalton practiced chiropody and published her first book *Essentials of Chiropody for Students* in 1938.

In 1939, Dalton married and had a son with Wilfred Thompson, who was killed three years later while serving in the Royal Air Force during World War II. Following the death of her husband, Dalton began studying medicine at the Royal Free Hospital in London in 1943. One year later she married Thomas Ernest Dalton, a Unitarian Minister, and together they had three children, two daughters and a son.

In July 1948, Dalton graduated with her medical degree while pregnant and became a trainee general practitioner in north London, where she began formulating her theory of premenstrual syndrome. Dalton noticed that several of her patients complained of recurring monthly ailments, such as headaches and asthma attacks that she likened to her own experiences. Dalton suffered from migraine headaches and recognized hers occurred more frequently at certain times of the month but disappeared when she was pregnant. Dalton suspected her monthly pattern of symptoms and those of some of her patients were related to the menstrual cycle. The menstrual cycle is a monthly series of changes a woman's body undergoes in preparation for the possibility of pregnancy [7]. To test her hypothesis that those monthly changes caused her patient's ailments, Dalton studied the medical records of patients who came in on a monthly basis.

Hypothesizing that headaches and asthma symptoms were related to the menstrual cycle and possibly to hormones [8], Dalton consulted her former teacher Raymond Greene, who focused on hormones [8] at the New End Hospital in Hampstead, England. Dalton and Greene suspected that the monthly headaches and asthma attacks resulted from low levels of progesterone [6], a female sex hormone [5].

In the 1930's, researchers isolated hormones [8] from other molecules. In 1929, Edgar Allen and Edward Doisy discovered the hormone [5] estrogen [4], but little was understood about its function. In 1931, physician Robert T. Frank published his paper "The Hormonal Causes of Premenstrual Tension", where he hypothesized that fluid retention caused by an excess of the female sex-hormone [5] estrogen [4] resulted in symptoms like severe headache and bloating in women. Estrogen plays a large role in primary and secondary female sex characteristic development and is normally elevated early on in the menstrual cycle and decreases upon ovulation [9], when a mature egg [10] is released for potential fertilization [11]. Dalton referenced Frank's work while researching PMS and found little supporting evidence for the effectiveness of estrogen [4] removal as a treatment for the condition. In addition to estrogen [4], researchers studied the female sex hormone [5] progesterone [6]. In 1933, Willard Myron Allen and George Washington Corner at the University of Rochester Medical School [12] in Rochester, Minnesota, had discovered progesterone [6]. Progesterone has several physiologic roles however, its primary role is in developing the endometrial lining of the uterus [13] for a potential pregnancy [7]. Progesterone levels normally fluctuate throughout the menstrual cycle, decreasing days before the onset of the period and become elevated during pregnancy [7].

Contrary to Frank, Dalton proposed that PMS symptoms resulted from too little progesterone [6] rather than too much estrogen [4]. To test her hypothesis, Dalton treated patients who complained of monthly physical and psychological symptoms with natural progesterone [6]. Dalton and Greene published their results in 1953. In the study, Dalton followed eighty-four women with PMS who she had instructed to track their symptoms on a calendar. Those women who reported more symptoms during the luteal phase of the menstrual cycle, a week before the onset of menstruation [3], were candidates for treatment. Dalton and Greene treated mild to moderate symptoms with oral doses of ethisterone, a synthetic progesterone [6] one week before those symptoms were expected to begin. Dalton injected natural progesterone [6] in patients who didn't respond to oral doses. Dalton observed that patients given injections had reduced premenstrual symptoms. In the publication, Dalton countered Frank's estrogen [4]-centered theory of the premenstrual condition. Dalton argued that the symptoms of PMS included more than just the tension and migraine headaches Frank had documented, but also included asthma, irritability, fatigue, and depression. Noting the increased number of possible symptoms, Dalton proposed that the term syndrome rather than the term tension be used to describe the condition and officially coined the term premenstrual syndrome.

After her 1953 publication, Dalton researched and treated PMS and other conditions hypothesized to be influenced by progesterone [6]. In 1957, Dalton opened an early PMS clinic at the London University College [14] Hospital in London. She directed the clinic for more than thirty years.

In her later career, Dalton focused more on the potential connection between PMS and behavior. Dalton suggested that hormones [8] could effect more than the physical workings of the body. In several of her papers, she suggested that PMS could lead to severe behavioral changes that led women to commit crimes. However, she never detailed how behavioral changes resultant from PMS physiologically occurred. More specifically, Dalton addressed the relationship between progesterone [6] and behavior in a 1960 paper, "Schoolgirls' Behavior and Menstruation." Dalton's research on menstruation [3] and crime continued to Holloway prison in London, where she surveyed convicted women over the course of six months. In the survey, she recorded their age, number of pregnancies, menstrual cycle details, and whether or not they reported PMS symptoms before or during menstruation [3]. Dalton observed that nearly half of those prisoners committed crimes before or during their menstrual periods and believed this rate correlated to fluctuations in progesterone [6].

Noting a correlation between PMS and behavior, Dalton's increasingly studied the influence of PMS on behavior, psychology, and the law. In 1964, Dalton ended her National Health Service position as a general practitioner and began seeing patients in a room on Wimpole Street in Central London, next to the headquarters of The Royal Society of Medicine. In 1964, Dalton published her first of many women's health books, titled *Premenstrual Syndrome*. The book increased her public presence and brought attention many aspects of women's general and reproductive heath, in addition to PMS.

In 1970, Dalton was the first female president of the general practitioner's section of the Royal College of Medicine and received the Migraine Prize from the Royal College of Practitioners in 1972, for her work linking migraine headaches to premenstrual syndrome. In 1978, she published her book *Once a Month: The Original Premenstrual Syndrome Handbook* where she explained the connection between hormones [8] and health. She also suggested ways of coping with PMS including advising women to tell their employers when they were suffering from PMS so that they could avoid trouble at work.

Due to her reputation as a PMS specialist, defense lawyers asked Dalton to provide expert testimony for the trials of women accused of crimes. In her 1980 paper, "Cyclical Criminal Acts in Premenstrual Women," Dalton chronicled the cases of three women convicted of manslaughter, arson, and assault. She testified as a medical expert arguing that the women committed their crimes the week before their period and hence PMS had influenced their behavior. Her testimony helped the accused women receive reduced sentences due to their diminished responsibility caused by PMS, on the grounds that they be treated with progesterone [6]. In the years that followed, Dalton testified in fifty cases in the defense of women who committed crimes while experiencing symptoms of PMS.

In 1988, Dalton attended a seminar at the Western Medical Center in Santa Ana, California, where she discussed the potential connection between postpartum depression and progesterone [6] deficiency, a theory she developed further in her 1996 book, *Depression after Childbirth*. During pregnancy [7], progesterone [6] levels increase significantly and remain consistently high for the duration of fetal development. Progesterone reinforces the development of the endometrium [15], a tissue lining the uterus [13] that provides nourishment to the developing fetus [16]. Following birth, the levels of progesterone [6] drop. Dalton argued that postpartum depression, like PMS, resulted from a deficiency in the hormone [5]. As with PMS, Dalton brought postpartum depression into public recognition and also treated it with progesterone [6] supplementation.

In addition to her studies with progesterone [6], Dalton questioned the safety of prescribing high doses of vitamin B6. In 1987, Dalton coauthored a paper with her son Michael J. T. Dalton titled "Characteristics of pyridoxine overdose neuropathy syndrome." In the study Dalton saw 172 women who reported neurological symptoms such as muscle weakness, tingling sensations and limb numbness. While conducting preliminary blood serum tests, Dalton observed that sixty percent of the women had elevated levels of vitamin B6 and suspected the high levels as a potential cause of the women's symptoms. Dalton found that when she reduced the serum levels of B6 to a normal level, her patients completely recovered within six months. Around the time of this study, vitamin B6 supplements were common treatment for PMS, a use she disagreed with. Dalton's work on vitamin B6 deficiency was part of the basis on which in 1997 the UK Committee on Toxicity restricted the sale of vitamin B6 to doses of one milligram or less per day.

Into the twenty-first century, scientists debated Dalton's theories of PMS and its causes. Despite the controversy surrounding Dalton, progesterone [6] was one of the treatments available for premenstrual syndrome, often in the form of birth control [17] pills.

In 2000, Dalton retired and spent her time in Heresford and Poole, England. Dalton died at the age of eighty-seven on 17 September 2004 in Poole.

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