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This Week's Citation Classic®

Hallberg L, Högdahl A-M, Nilsson L & Rybo G. Menstrual blood loss—a population study. Variation at different ages and attempts to define normality. *Acta Obstet. Gynecol. Scand.* 45:320-51, 1966.
[Depts. Medicine II and Obstetrics and Gynecology, Univ. Göteborg, Sweden]

Menstrual blood loss was studied in 476 randomly selected women in Göteborg in six age groups between 15 and 50 years. The mean losses and its variations were about the same in all age groups—except the 15-year-old group (slightly lower) and the 50-year-old group (slightly higher). Losses were related to signs of iron deficiency (critical limit: 80 ml) and subjective judgment of magnitude. [The *SCI*® indicates that this paper has been cited over 125 times, making it one of the most-cited papers published in this journal.]

Leif Hallberg
Department of Medicine II
and
Göran Rybo
Department of Obstetrics
and Gynecology
University of Göteborg
Sahlgren Hospital
S-413 45 Göteborg
Sweden

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In 1960 a colleague in England told one of us (LH) about a woman with long-standing iron deficiency anemia who rapidly relapsed after treatment. No obvious cause was found, and she considered her menstrual blood losses normal. The losses were measured using ^{51}Cr and showed that she lost about 500 ml each menstrual period, a very large amount. Interestingly, however, the patient was a gynecologist, a fact that clearly demonstrates the difficulty in estimating the magnitude of menstrual losses in the absence of precise measurement. The conclusion was that a simple but reliable method to measure menstrual blood losses was urgently needed. We developed a method that used both tampons and towels to ensure a complete collection and a sodium hydroxide solution to extract all heme pigments.[1]

We planned to test the method by measuring the blood loss in two consecutive periods in 12 nurses. The first results showed such an unexpected constancy in each woman that we decided to continue for 12 periods. The variation was very small for each woman.[2] This was also found in a study involving 117 women measured twice. Mean losses were the same at different ages, suggesting that the blood losses were about the same throughout the fertile age period.[3] That, in turn, implied that if we knew the variation of the menstrual blood loss in a random sample of women, it would be possible to calculate the true distribution of the iron requirements in women (disregarding periods of pregnancy and lactation) since the basal iron losses from the skin, etc., can be considered to be fairly small, constant, and mainly related to body size.

The paper reports the menstrual blood loss in 476 women (15-50 years old) randomly selected at six age strata from the population of Göteborg. Average loss was 43.4 ± 2.3 ml.

The paper is cited frequently because it was the first study on menstrual blood losses in a large, randomly selected sample and because the main results—(a) the marked skewness of the distribution of the losses, (b) the very similar losses at different ages, and (c) the poor agreement between the subjective judgment and the measured losses—had important implications in both clinical and public health. The paper is also cited as normal material in studies on intrauterine contraception known to increase menstrual blood loss.[4]

Our results made it possible to calculate the variation in iron requirements in women. It explained why there is a much higher risk of iron deficiency in some women, and it became possible to evaluate the iron nutrition in a population (the risk of being iron deficient) by relating iron requirements to properties of the diet. The validity of such calculations has since been shown by confirmation of the present distribution of menstrual iron losses in other populations, e.g., Burma, Canada, China, England, and Egypt.

1. **Hallberg L & Nilsson L.** Determination of menstrual blood loss. *Scand. J. Clin. Lab. Invest.* 16:244-8, 1964. (Cited 120 times.)
2. ————. Constancy of individual menstrual blood loss. *Acta Obstet. Gynecol. Scand.* 43:352-9, 1964.
3. **Hallberg L, Högdahl A-M, Nilsson L & Rybo G.** Menstrual blood loss and iron deficiency. *Acta Med. Scand.* 180:639-50, 1966.
4. **Rybo G.** The IUD and endometrial bleeding. *J. Reprod. Med.* 20:175-82, 1978. (Cited 20 times.)

