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DETERMINATION OF HEMATOCRIT BY FILTER PAPER TECHNIQUE.

Decha Romsai, B.Sc. (M.T.), M.S.
Tawat Tositarat, B.Sc. (M.T.).
Panja Kulapongs, M.D.

ABSTRACT

A simple technique of weighing the blood collected onto filter paper has been introduced as the possible alternative for determination of hematocrit value in the field study. The principle is based on the known relationship between the hematocrit value and the specific gravity or weight of the whole blood. The validity of this technique was evaluated in 34 blood samples of known hematocrit values. The filter paper method was carried out according to the technique described by Joselow and Stefaniwski. The linear relationship between the weight of the dried blood samples collected onto the filter paper and their hematocrit values was observed. The hematocrit values read off the regression line varied up to 30% which is unacceptable. This technique is not recommended for anemia screening even in the field study.

INTRODUCTION.

The basic principle of the copper sulfate technique, the widely used blood bank screening procedure, is the relationship between the hematocrit value and the specific gravity or weight of the whole blood [1]. Based on this known relationship, a new and simple techniqne for determination of hematocrit value by weight was introduced [2]. It was felt that if the accuracy is within the acceptable range, this technique may be a satisfactory alterna-

Department of Clinical Microscopy, Faculty of Associated Medical Sciences, Chiang Mai University.

tive for determination of hematocrit in the field, particularly where a hematocrit centrifuge is not available. The validity of this filter paper technique was evaluated in our laboratory.

MATERIALS AND METHODS

Thirty four blood samples of known hematocrit values were tested. The filter paper procedure was carried out according to the technique described by Joselow and Stefaniwski [2]. Ample amount of blood sample was allowed to be absorbed freely onto 3 circular Whatman filter paper No 4 to form blood spots of approximately 3-4 cm. in diameter then dried in hot air oven. Three 1/4 inch round discs were made from each blood spots and from the adjacent area by the ordinary office punch, and weighed with the microanalytical balance. The weight of the dried blood absorbed onto each disc was obtained by subtracting the weight of the blank disc from that of the blood-impregnated disc.

RESULTS.

The results obtained from triplicate samples of 3 filter papers and 9 discs for each blood sample varied minimally, between 0-2% of the average value. The linear relationship was observed when the average weight of dried blood samples were plotted against their known hematocrit values (Figure 1). The regression equation for this line was:

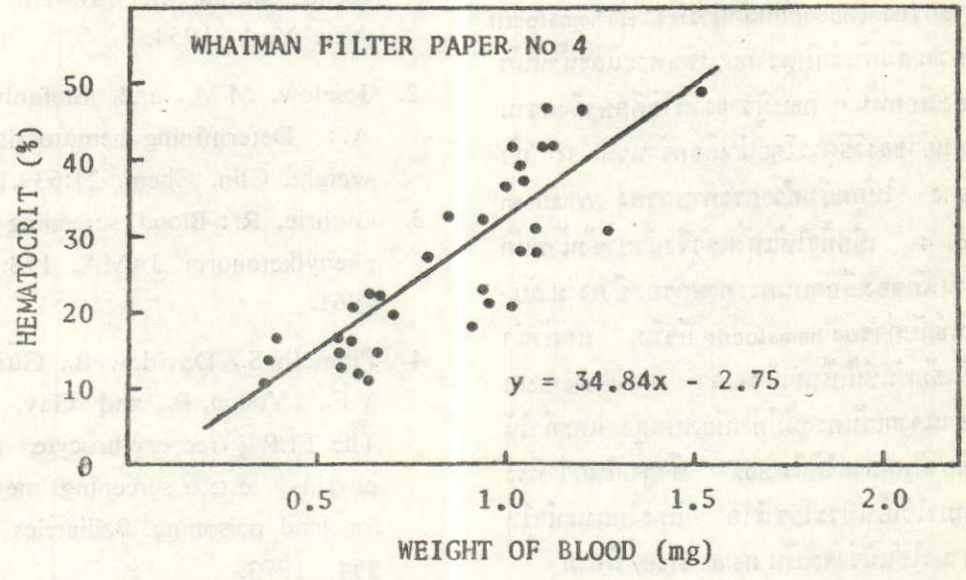
$$Y = 34.84 x - 2.75$$

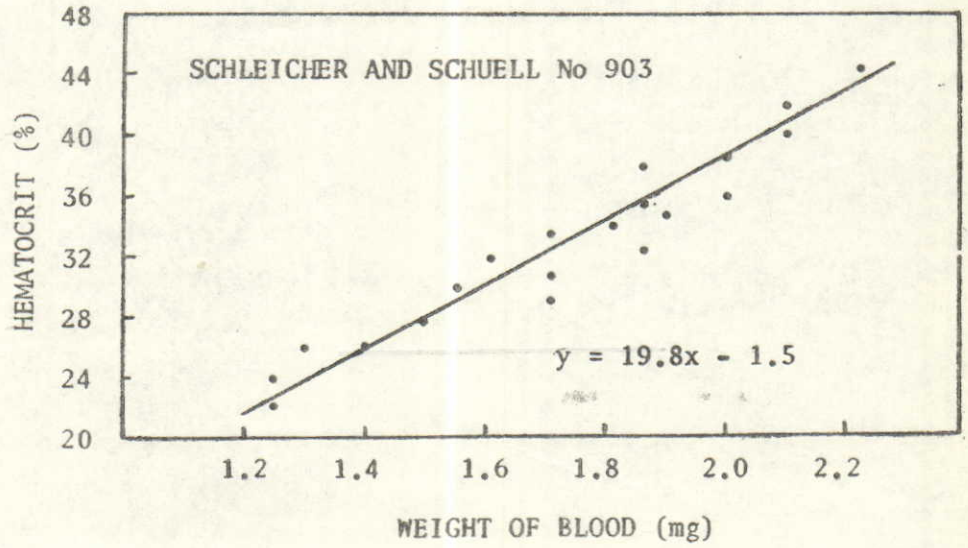
where Y= hematocrit value, and x= the weight (mg) of dried blood on the disc. The hematocrit values read off from this regression line differed from that obtained from standard hematocrit centrifuge as much as 30%

COMMENTS.

The filter paper, a medium on which the blood sample is collected, dried and weighed has been widely used for collection and transport blood samples in phenylketonuria and lead poisoning screening studies (3,4). The procedure of the technique is simple and required only capillary blood sample. The filter paper employed must be thick enough, such as the Whatman filter paper No. 4 or Schleicher and Schuell No 903. The blood-impregnated discs are easily obtained by the ordinary office punch. Unfortunately, the coefficients of variation for the hematocrit value obtained by this study is greater than the acceptable range and can not be recommended for anemia screening even in the field study.

FIGURE I: RELATIONSHIP BETWEEN HEMATOCRIT AND WEIGHT OF BLOOD ON PAPER DISC





บทคัดย่อ

Joselow และ Stefaniwski ได้รายงานถึงวิธีหาค่า hematocrit ของเลือดอย่างง่ายด้วยการซึมน้ำหนักของโลหิตที่ดูดซึมติดอยู่กับกระดาษกรอง โดยอาศัยหลักการที่ว่า ค่า hematocrit มีความสัมพันธ์กับความถ่วงจำเพาะและน้ำหนักของเลือดนั้น ๆ คณะผู้รายงานได้ศึกษาถึงความแม่นยำของวิธีการโดยนำเลือดจำนวน 34 ตัวอย่าง ให้ดูดซึมด้วยกระดาษกรอง Whatman No. 4 เมื่อทิ้งให้แห้งแล้วจึงนำมาชั่งน้ำหนัก น้ำหนักของเลือดบนกระดาษกรองมีความสัมพันธ์กับค่าของ hematocrit ก็จริง แต่ถ้านำเส้นสัมพันธ์นี้เป็นหลักพบว่า ค่า hematocrit ที่อ่านจากเส้นตรงนี้มีค่าเบี่ยงเบนสูง และทำให้ได้ค่าผิดพลาดได้ถึง 30% ซึ่งสูงเกินกว่าที่จะนำมาใช้เป็นประโยชน์ได้ และไม่แนะนำให้เอามาใช้แม้ว่าจะเป็น field study ก็ตาม.

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