Blood donation in the Greek island of Santorini: Prevalence of ferritin, folic acid and vitamin B12 deficiency in repeat blood donors with acceptable haemoglobin levels for blood donation

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Background:

Iron deficiency has been recognised as a result of repeated whole blood donation. This may not be evident through pre-donation haemoglobin (Hb) measurements; therefore, blood establishments should take appropriate measures to minimise this problem and protect donors' health.

For 32 years, residents of the Greek island Santorini have voluntarily donated blood twice a year (Spring-Autumn). Approximately 1600 blood units are collected annually, increasing to over 2000 units after introduction of a third donation event in 2023. This study of repeat donors examines iron status (ferritin-FER level measurement) and other haematinins (serum Folic Acid-FA and vitamin B12) in relation to donor's medical history and the frequency of whole blood donation over a period of 5 years.

Methods:

Medical staff assessed prospective donors with a brief medical history, observation and simple tests like haemoglobin measurement with a non-invasive haemoglobin counter. People who had donated 8 times or more from Spring 2018 were eligible for this study. Hb, haematocrit (Hct), FER, FA and B12 levels of the participants were measured using an automated analyzer in the same laboratory.

Results:

Of 854 volunteers in Spring 2023, 764 were medically suitable and 90 (11%) unsuitable for blood donation. Low Hb was the reason for the denial of donation to 18 prospective donors (males, M: 5, females, F: 13) with median age 37 years (range: 19-54). From the 764 donors, 131 (M: 104, F: 27; median age 47, range 29-65 years) donated 8 to 12 times. Median FER was 43.0 (3.0-392.0 μg/L) and 13 (10 %) donors (M: 8, F: 5) had low levels (< 15.0 μg/L) . Median FA was 7.4 (2.2-24.1ng/dL); 5 donors (4%; M:5) had low levels of FA (<3.1 ng/mL) and 4 (3%; F:4) had high levels (>20.5 ng/mL). Median B12 was 282.0 (67.0-760.0pg/ml); 17 (13 %; M:14, F:2) had a low level (Table 1.). Of 21 volunteers who had donated at all the last 12 events, 6 (M: 4, F: 2) had low FER, one (M:1) had low FA and two (M:2) had low B12 (Table 2.).

FER (p=0.15) and B12 (p=0.33) did not differ statistically significantly by gender but FA was lower in males (p<0.001). Logistic regression showed a statistically significant (p = 0.012) relationship of low FER to the number of donations. The proportion with low FER increased from 4.1% (8-9 donations) to 8.2% (10-11 donations) and 28.6% (12 donations).

Table 1. Parameters of donors

	MALE			FEMALE			TOTAL		
	MEAN	MEDIAN	RANGE	MEAN	MEDIAN	RANGE	MEAN	MEDIAN	RANGE
AGE	47	47	29 - 65	48.3	49	31 - 64	47.3	47	29 - 65
Ht %	45.2	45	38 - 54	40.7	40	37.1 - 46	44.2	44.5	37.1 - 54
Hb g/dL	15.2	15.2	12.7 – 17.0	13.5	13.3	12.0 - 15.5	14.8	15	12 - 17
Hb POC	15	14.9	13.5 - 17.0	13.6	13.5	12.5 – 16.0	14.7	14.7	12.5 – 17.0
FER μg/dL	58	46	7 - 392	35.7	30	3 - 107	53.4	43	3 - 392
FA ng/dL	7.8	7.1	2.2 - 18.7	11.1	8.9	3.3 - 24.1	8.5	7.4	2.2 - 24.1
B_{12} pg/dL	287.3	277	67 - 629	365.6	360	171 - 760	303.4	282	67 - 760

Table 2. Parameters of donors depending on the frequency of blood donations

	MALE			FEMALE			TOTAL		
	LOW	NORMAL	HIGH	LOW	NORMAL	HIGH	LOW	NORMAL	HIGH
8 times									
FER μg/dL	0	13	1	1	3	0	1	16	1
FA ng/dL	0	14	0	0	4	0	0	18	0
B_{12} pg/dL	0	14	0	0	4	0	0	18	0
9 times									
FER μg/dL	1	22	0	0	8	0	1	30	0
FA ng/dL	1	22	0	0	8	0	1	30	0
B_{12} pg/dL	6	17	0	1	7	0	7	24	0
10 times									
FER μg/dL	2	25	0	1	4	0	3	29	0
FA ng/dL	2	25	0	0	4	1	2	29	1
B_{12} pg/dL	3	24	0	1	4	0	4	28	0
11 times									
FER μg/dL	1	23	0	1	4	0	2	27	0
FA ng/dL	1	23	0	0	4	1	1	27	1
B_{12} pg/dL	4	20	0	0	5	0	4	25	0
12 times									
FER μg/dL	4	12	0	2	3	0	6	15	0
FA ng/dL	1	15	0	0	3	2	1	18	2
B_{12} pg/dL	2	14	0	0	5	0	2	19	0

Conclusions:

These results suggest that a third annual blood donation event can be scheduled with safety. We plan to suggest the inclusion of FER, FA, B12 measurements in the annual checkup of repeat donors. Supplementary iron, FA, B12 could be prescribed, and a ferritin-guided donation interval policy adopted. The Spring blood session follows Orthodox Easter, before which many people avoided meat, eggs, dairy products and other iron or B12-containing foods for over 40 days. Such fasting should be included in the donor selection questionnaire and in the replacement strategy for iron and ferritin in repeat donors.