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BLOOD DONATION PRACTICE IN LATVIA AND IN THE WORLD

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Donor blood quality and possibility to help somebody depends on blood donor's health condition before and after blood donation and blood structures physiological recovery abilities. Recovery of blood physiological structure is associated with the length of time between blood donations. If donations are regular, a person can be at risk of iron deficit, especially if there is no perusal control of haemoglobin (Hb) level before blood donation. Most reports agree that anaemia occurs much more frequently among female donors. There is not an exact answer for recovering time between donations in the world practice, therefore we have analysed blood physiological structure criteria after blood donation and blood structure recovery factors. Besides we have considered the recovery time practice in different countries and compared it with Latvia data.

Key words: blood donation, blood structure recovery, haemoglobin, iron deficit.

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INTRODUCTION

Circulation of blood has got huge importance to maintain all physiological processes. Blood is composed of blood cells and plasma - liquid part with dissolved organic and nonorganic materials. The amount of an adult human blood capacity is approximately 7% of body mass; children have relatively more blood than adults. Amount of blood in organism is relatively constant (Slaidiņš & Purne 1985). If a person loses a lot of blood capacity, it can be lethal for a person.

The role of transfusion

One of an important clinic medicine specialization is transfusion - blood replacement liquids and blood components transfusion. Transfusion plays a significant role in medicine, e.g. surgery, genecology, intensive care, oncology. All process is adhered by accurate transfusion technique to avoid complications after blood transfusion (Bergman 1977).

A huge role of blood components quality depends on health of blood donors. It is necessary to

pay attention to donors with rare blood groups. No more than 15% of the circulating blood capacity (450ml ± 10%) can be taken from a donor (Ņemceva 2009). A blood donor should be in a good health condition, because blood recovery mechanism demands a lot of energy costs, otherwise a risk of acute post-haemorrhagic anaemia is inevitable. Female donors, young donors, first-time donors, low-weight donors and donors with low pre-donation blood pressure can have post-donation negative reaction rates more often than other donors. The most important variables (in descending order) were age, weight, and donation status (first-time or repeated donor) (Trouern-Trend et al. 1999, Eder 2009).

Blood structure recovery after donation

Hemodynamic indices change immediately after blood donation: arterial and venous pressures, heartbeat decrease slightly (Slaidiņš & Purne 1985). All vasovagal reactions normalize in 7 hours (Conry-Cantinlena 2001). After blood loss or donation early and later compensate mechanisms activate in organism, mainly by enhancing erythropoiesis and blood protein recovery (Leja 1988).

At first early compensate mechanisms activate. Spasms of injured blood-vessel start; blood clotting system activates and oxygen penetration into the tissues increases. After that later compensate mechanisms activate. It enlarges erythropoiesis and blood protein composition recovery processes (Conrad & Crosby 1981). Fowler and Barer (Fowler & Barer 1942) as well as Alstead (Alstead 1943) entitled their studies "Rate of haemoglobin regeneration" and showed a considerable variation between individuals. Wadsworth (Wadsworth 1955) concluded that Hb levels were the lowest during the 1st or 2nd weeks after haemorrhage of approximately 400 ml of blood but they rapidly reached pre-donation levels within the 3rd and 4th weeks. Blood protein necessary amount normalizes in 8-10 days after blood donation (Leja 1988). It is proved, that regular donors' periphery blood pressure changes return back faster than indicators of a first-time donor. In this way frequent blood donations can increase normalization of blood system activity (Slaidiņš & Purne 1985, Yilmaz et al. 2013).

Iron deficit

Iron has got a significant role in the growth of all cells. That is why it is not surprising that iron-deficit anaemia increases morbidity and mortality (Nissenson et al. 2003). Iron deficit is one of the most common disorders affecting humans, and iron-deficit anaemia continues to represent a major human health problem worldwide. There are an estimated 3.5 billion iron-deficit people worldwide in 2000, the majority of them are in developing countries (United Nations Sub-Committee on Nutrition 2000).

It has been found, that 2 ml of blood approximately contains 1 mg of iron (Lejniece 2002). The average phlebotomy of 472 ml represented the loss of about 236 mg of iron from the male and 213 mg from the female (Finch et al. 1977). By assuming an average absorption of 10% of the iron in a medical form, the daily elemental iron requirement is 10 mg in children, adult males, and postmenopausal women, 20 mg in young non-pregnant women, and 30 mg in pregnant women (Food and Nutrition Board 2001).

Most reports agree that anaemia occurs much more frequently among female donors and this sex difference decreases after menopause (Frick 1970). It is especially common among women of childbearing age because of pregnancy, lactation and menstrual blood loss (Alleyne et al. 2008, Rago et al. 2004). In a Danish study women donors had lower S-ferritin than non-donors in all age-groups and in pre- and post-menopausal groups ($p < 0.001$ in all groups). Iron deficit anaemia (i.e., S-ferritin < 15-mu-g/l and Hb < 121 g/l) was seen in 2.8% of women donors vs. 1.5% of women non-donors (Milman & Kirchhoff 1991).

Amounts of extra iron storage vary between sexes. It is proved that adult men have about 1000 mg iron storage; however, women in reproductive stage of life have only 250-500 mg of iron storage because of regular menstrual blood loss. After

each blood donation a man needs three months for extra iron storage recovery, likewise woman needs 1,5 years for recovery without extra iron consumption (Finch 1972).

World donation practice

In most countries the minimum interval between two donations is 8 weeks (Yilmaz & Kaya 2013). The annual amount of whole-blood donation is regulated as well and, for example, should not exceed 3000 ml per year for men in Germany (Kretschmer & Karger 2001). On the one hand, donation times per years could be associated with economic status and welfare of country, as shows Netherlands (3 times for women and 5 times for men) and the United Kingdom (3 donation times per year). On the other hand the USA (American Association of Blood Banks 2006) and Canada practice relatively short recovering time between donations (56 days), but still have high development index (Human Development Report 2011).

Pottgiesser (Pottgiesser et al. 2008) confirms the minimal, recommended donation intervals (56 days for men) as adequate when, for the first time, judged upon by total mass Hb as a direct marker of hematologic recovery.

Required Donation interval in Latvia is two months. Men can donate blood six times per year, but after that three months interval is needed. For women it is recommended to donate blood not more than four times per year (LR MK Nr.1037 (27.12.2005.)). Norms are taken into strict consideration, because there is no possibility to screen ferritin and iron storage, as well as donors' diet. Unfortunately, haemoglobin control before blood donation detects anaemia, but it`s impossible to expose latent or pre latent iron-deficit anaemia.

DISCUSSION

There is no universal recovering time between donations in world practice. Recovering time highly varies in each country. It often depends on the average haemoglobin level, health condition and height parameters of the population.

There is a high prevalence of iron deficit in frequent donors' blood. Increasing the donation interval would reduce the prevalence of iron deficit and Hb level. There are necessary health protection activities, which should decrease iron deficit risks in donors. Alternatively, replacement with iron supplements may allow frequent donation without the adverse outcome of iron deficit. As shows data, especially women should be more accurate about this problem, if they are regular donors. We advise to check ferritin and Hb levels before each blood donation to regular blood donors. Ideally, the frequency of phlebotomy should be adjusted according to S-ferritin as well as Hb levels. If Hb is used as single criterion for donation, only donors with pre donation values greater-than-or-equal-to 12.4 -12.5 g/dl should be allowed to undergo phlebotomy.

In general, Latvian standards of donation recovery time absolutely agrees with the world practice. But still, as a future perspective, further research should reveal the context of regular donations and possible changes in the Hb recovery rate as well as chronic iron deficit among Latvian donors.

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