LETTER

Investigation of potential pro-coagulation activity markers in healthy individuals

Dear Editor,

Thrombosis is one of the commonest causes of mortality in developed countries nowadays. It occurs when two or more thrombophilic risk factors act together. Our study aimed to investigate simple and sensitive assays which might be used as early biomarkers of coagulation activation.

Our studied sample consisted of 32 individuals, aged 18-51 years, who responded voluntarily to the open announcement of our laboratory for subject recruitment. None of the participants used medications that could affect hemostasis. A full medical history (family history of thrombosis, obesity, smoking, oral contraceptives, hereditary diseases e.g. sickle cell disease, etc) was recorded for each participant, in order to identify potential presence of thrombophilic factors or family history of thrombophilia.

First line coagulation tests, which included prothrombin time (PT), activated partial thromboplastin time (aPTT), and fibrinogen concentration were initially estimated. Full thrombophilia testing was performed by assessing the activity of antithrombin (AT), protein C (PC), protein S (PS), Factor VIII (FVIII), Factor VII (FVII), XII (FXII) and the concentration of homocysteine and by investigating the presence of factor V-Leiden, lupus anticoagulant, and prothrombin G20210A mutation. Potential current coagulation activation, was evaluated by determining the concentration of D-dimers, the activity of coagulation factors IX and XI[1], the concentration of sP-selectin[2], the level of C-Reactive Protein (CRP) semi-quantitatively, the rotation thromboelastometry ex-TEM (activation of the extrinsic pathway) and in-TEM (activation of the intrinsic pathway) (ROTEM analyzer)[3] thromboelastograms were assessed in respect to clotting time (CT) and clot firmness (MCF), which are expected to be decreased and increased respectively when coagulation is activated). Platelet indices, mean platelet volume (MPV) and platelet distribution width (PDW), were also measured on a hematology analyzer.

Participants were categorized into three groups, according to the presence of thrombophilic factors, as they were assessed from laboratory tests and review of their medical history: Group A, with no thrombophilic factors at all; Group B, with one thrombophilic factor; and Group C, with two or more thrombophilic factors.

Statistical analysis included comparisons of potential markers reflecting activated coagulation with one-way ANOVA test and t-test among the aforementioned groups.

Statistically significant differences ($p < 0.05$) among the studied groups were found for inTEM-CT and exTEM-CT. Individuals with two or more thrombophilic factors presented lower thromboelastometry clotting times (mean inTEM-CT=125.3 and mean exTEM-CT=47.3), compared to those with one (mean inTEM-CT=158.6 and mean exTEM-CT=65.5) or those with no thrombophilic factors (mean inTEM-CT=151.1 and mean exTEM-CT=64.3). The fact that statistically significant differences were made possible to be detected from such a small sample of 32 participants is a very important point of our study, suggesting that inTEM- and exTEM-CT might present pronounced changes even from the initial stages of coagulation process; therefore, it would be of interest to be further investigated whether the above parameters could be used as early biomarkers of coagulation activity, at its initial stage, before clots are formed and before overt signs of thrombosis are present. Thromboelastometry is nowadays evolving as a routine testing method in an increasing number of medical laboratories and its use in screening for thrombosis is feasible.

References

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Conflict of interest

None.

Keywords: Biomarkers, thrombophilia, hypercoagulability, thromboelastography, thromboelastometry

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