EBioMedicine 74 (2021) 103682

Contents lists available at ScienceDirect

EBioMedicine

journal homepage: www.elsevier.com/locate/ebiom

Commentary

Anthocyanin on platelet function in people with dyslipidaemia

Ayodele A. Ogunleye

Freelance

ARTICLE INFO

Article History:
Received 13 October 2021
Accepted 25 October 2021

Anthocyanin is a natural flavonoids derived from plants, and its supplements have been extracted from fruits such as grapes, European bilberry, blackcurrants and blueberries. It has antioxidant properties and shows effect in inhibiting expression of adhesion molecules [1]. Due to the bleeding risk of antiplatelet drugs [2], anthocyanin seems to be a promising alternative for inhibiting platelet hyperactivity and expression of adhesion molecules in individuals with dyslipidaemia.

Dyslipidaemia is a public health problem because of its causal relationship with atherosclerotic cardiovascular disease and the resulting coronary heart disease, which are a major cause of death. There is evidence that people with dyslipidaemia can exhibit platelet hyperactivity (which are associated with reactive oxygen species & oxidative stress) [3], and which may in turn lead to thrombotic event [4]. Therefore, reducing platelet hyperactivity and reactive oxygen species levels with anthocyanin will not only reduce thrombotic event, but this may reduce other associated conditions, such as thromboembolism.

In a recent study published by EBioMedicine, Tian *et al*. evaluated the effect of anthocyanin supplements (Medox, Norway) on platelet function [1]. In this trial, patients were randomly assigned to placebo or anthocyanin (either 40 mg/day, 80 mg/day, 160 mg/day or 320 mg/day) groups, and were treated for 12 weeks. Their results indicated that 80mg, 160mg or 320mg of anthocyanin per day for 12 weeks may inhibit platelets function in the intervention group subjects with dyslipidaemia [1].

Apart from the significant reduction of platelet hyperactivity and oxidative stress in people with dyslipidaemia, the authors also showed that different doses of anthocyanin supplements could reduce platelet reactive oxygen species, urinary 8-iso-prostaglandin F2α (8-iso-PGF2α) and malondialdehyde (MDA) levels, which were positively correlated with changes in both collagen-induced platelet aggregation and adenosine diphosphate-induced platelet aggregation after 12 weeks of anthocyanin treatment [1].

Before this study [1], other studies have shown the anti-oxidative and anti-inflammatory effects of anthocyanin supplement in people with dyslipidaemia [5]. The health benefits of anthocyanin on cardiovascular and neurodegenerative diseases were also highlighted previously [6,7]. Besides its ability to decrease brain oxidative stress, previous work suggests that anthocyanin consumption may improve brain perfusion, cognitive function, ameliorate early memory decline and enhance neural responses in older adults with working memory challenges [7]. But more studies are needed in humans, since most of the previous studies on the effect of anthocyanin were either in vitro or conducted in animals [5,8]. This double-blind, randomised, controlled clinical trial conducted in humans [1], provides a valuable information on the health benefits of anthocyanin.

Although Tian et al. have shown some interesting findings, this study may, however, leave readers with unanswered questions which should be addressed in future research. For example, future larger trials in diverse populations with different lifestyles (such as physical activity levels and diet) will further strengthen the findings shown by Tian et al. [1]. In addition, the benefit of anthocyanin on platelet function in people with other clinical conditions (especially other components of the metabolic syndrome, such as central obesity, hypertension and diabetes) will be important. Studies that will follow study participants longer than 12 weeks and with other robust forms of data collection methods may also corroborate the evidence of some health benefits of anthocyanin shown in this and in other previous trials. The unknown effect of anthocyanin in people with dyslipidaemia that are younger than 35 years or older than 70 years undoubtedly remains.

A further highlight of the study is that adverse events were reported only in four subjects who received different doses of anthocyanin. The adverse events were: one dark stool (with 320 mg/day); one diarrhoea (with 160 mg/day); one dizziness (with 80 mg/day) and one rash (with 80 mg/day). Overall, this study showed that anthocyanin has no significant adverse effect on participants [1], but readers may be interested in the interaction of anthocyanin with other medications, and its use in people with dyslipidaemia who also have other medical conditions. The reason why some subjects benefited the most from this study should also be evaluated in future basic and clinical researches.

In summary, Tian et al.'s study sheds some light on the potential clinical application of anthocyanin. The study is important in hypothesis generation and adds to the literature which suggests that

DOI of original article: http://dx.doi.org/10.1016/j.ebiom.2021.103533.
E-mail address: ayogunleye@gmail.com

https://doi.org/10.1016/j.ebiom.2021.103682

anthocyanin could reduce platelet aggregation (especially collagen-induced platelet aggregation & adenosine diphosphate-induced platelet aggregation) and reduce oxidative stress (platelet reactive oxygen species) in people with dyslipidaemia. This work will guide recommendations on the optimal dosages of anthocyanin supplements for humans. However, further clinical trials are still necessary to identify the effectiveness and safety of anthocyanin as an anti-platelet.

Declaration of Competing Interest

Author has nothing to declare.

References

[1] Tian Z, Li K, Fan D, Zhao Y, Gao X, Ma X, et al. Dose-dependent effects of anthocyanin supplementation on platelet function in subjects with dyslipidemia: a randomized clinical trial. EbioMedicine 2021.
[2] Zheng SL, Roddick AJ. Association of aspirin use for primary prevention with cardiovascular events and bleeding events a systematic review and meta-analysis. Jama-J Am Med Assoc 2019;321(3):277–87.
[3] Barale C, Bonomo K, Frascaroli C, Morotti A, Guerrasio A, Cavalot F, et al. Platelet function and activation markers in primary hypercholesterolemia treated with anti-PCSK9 monoclonal antibody: a 12-month followup. Nutr Metab Cardiovasc Dis 2020;30(2):282–91.
[4] Stone GW, Witzenbichler B, Weisz G, Rinaldi MJ, Neumann FJ, Metzger DC, et al. Platelet reactivity and clinical outcomes after coronary artery implantation of drug-eluting stents (ADAPT-DES): a prospective multicentre registry study. Lancet 2013;382(9892):614–23.
[5] Zhang H, Xu Z, Zhao H, Wang X, Pang J, Li Q, et al. Anthocyanin supplementation improves anti-oxidative and anti-inflammatory capacity in a dose-response manner in subjects with dyslipidemia. Redox Biol 2020;32:101474.
[6] Khoo HE, Azlan A, Tang ST, Lim SM. Anthocyanidins and anthocyanins: colored pigments as food, pharmaceutical ingredients, and the potential health benefits. Food Nutrition Res 2017;61(1):1361779.
[7] Mattioli R, Francioso A, Mosca L, Silva P. Anthocyanins: A comprehensive review of their chemical properties and health effects on cardiovascular and neurodegenerative diseases. Molecules 2020 Aug 21;25(17):3809. PMID:32825684;PMCID: PMC7504512. doi: 10.3390/molecules25173809.
[8] Thompson K, Hosking H, Pederick W, Singh I, Santhakumar AB. The effect of anthocyanin supplementation in modulating platelet function in sedentary population: a randomised, double-blind, placebo-controlled, cross-over trial. Br J Nutr 2017;118(5):368–74.