

Endothelial Dysfunction in the Young Adult: a Retrospective Cohort Study on the Effect of Low Birth Weight

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ABSTRAK

Tujuan: untuk mengetahui efek bayi berat lahir rendah (BBLR) terhadap fungsi endotel dan menentukan peran adiponektin plasma pada disfungsi endotel melalui pemeriksaan flow mediated brachial artery (FMBA) atau respon vasodilatasi (VR) dan mengukur kadar asymmetrical dimethylarginine (ADMA) plasma subjek dewasa muda dengan riwayat BBLR. **Metode:** pada penelitian kohort retrospektif, subjek diambil secara acak dari suatu growth study cohort Kecamatan Tanjungsari Kabupaten Sumedang Jawa Barat. Mereka terdiri atas 67 subjek dengan riwayat BBLR dan 67 subjek dengan riwayat bayi berat lahir normal (BBLN). Variabel terikat adalah kadar adiponektin plasma, ADMA plasma dan nilai VR. Uji yang digunakan untuk mengetahui korelasi antara adiponektin plasma dan ADMA adalah korelasi Pearson. **Hasil:** kelompok BBLR secara bermakna mempunyai VR yang lebih rendah, RR=2,94 dengan 95% CI=1,91-4,53; dan kadar adiponektin plasma rendah RR =1,53 dengan 95% CI =1,07-2,18. Seluruh variabel (plasma adiponektin, plasma ADMA dan nilai VR) antara kelompok BBLR dan BBLN menunjukkan perbedaan bermakna pada 2 variabel yaitu nilai VR ($p < 0,001$, 95% CI= -4,409-(-2,114) dan kadar adiponektin plasma yang lebih rendah ($p = 0,015$, 95% CI= -1,083-(-0,082) pada kelompok BBLR dibandingkan kelompok BBLN. Tidak ada korelasi antara kadar adiponektin plasma dan kadar ADMA plasma, maupun antara kadar adiponektin plasma dan nilai VR. **Kesimpulan:** BBLR berefek pada fungsi endotel. BBLR dibandingkan dengan BBLN memiliki nilai VR dan adiponektin plasma yang lebih rendah. Adiponektin plasma berperan kecil pada disfungsi endotel subjek dewasa muda dengan riwayat BBLR.

Kata kunci: BBLR, adiponektin, ADMA, pemeriksaan FMBA.

ABSTRACT

Aim: to investigate the effect of low birth weight (LBW) on endothelial function, and to determine the role of plasma adiponectin in endothelial dysfunction by conducting flow mediated brachial artery (FMBA) test or vasodilation response (VR) and by measuring plasma asymmetrical dimethylarginine (ADMA) of young adults born with LBW. **Methods:** in a retrospective cohort study, subjects were randomly selected from the growth study cohort of Tanjungsari Sumedang district West Java. They consisted of 67 LBW and 67 NBW (Normal Birth Weight) young adults. Dependent variables were plasma adiponectin, plasma ADMA, and VR. The correlation between plasma adiponectin and ADMA level was examined using Pearson's correlation. **Results:** the relative risk for LBW to have low brachialis artery vasodilation response was 2.94, (95% CI: 1.91-4.53), and to have low of plasma adiponectin concentration 1.53, (95% CI: 1.07-2.18). There was a statistically

significant difference for all variables studied (FMBA, plasma ADMA, and plasma Adiponectin concentrations), while simultaneous confidence interval measurements indicated that the value of FMBA and the concentration of plasma adiponectin were significantly lower, respectively $p < 0.001$, 95% CI: -4.409-(-2.114), and $p = 0.015$, 95% CI: -1.083-(-0.082) in LBW compared to NBW subjects. The correlation between plasma adiponectin concentration and plasma ADMA concentration in LBW subjects was not significant. **Conclusion:** there is an effect of LBW on endothelial function. LBW compared to NBW subjects have lower VR and plasma adiponectin concentration. There may be a small role of plasma adiponectin in endothelial dysfunction of young adults with LBW.

Key words: low birth weight, adiponectin, ADMA, FMBA test.

INTRODUCTION

Low birth weight (LBW) may increase the risk of cardiovascular diseases during adulthood. Intrauterine growth restriction can lead to alteration of organ, function, and metabolism and also to persistent endocrine disorders.¹ Adiponectin is a protein that is synthesized by fat cells, and play an important role in fetal growth.^{2,3} In LBW, the low adiponectin concentration persists through the childhood and adulthood.^{4,5} Apart from insulin sensitizer effect, adiponectin has also antithrombotic and antisclerotic properties, that directly influence the endothelial function.⁶

Endothelial dysfunction is a foundation for atherosclerosis. One of the endothelial functions which will first be disturbed is vasodilation and vasoconstriction balance. Nitric oxide (NO) is one of vasodilators produced by the endothelial cells, which has a very short half-time of 3-5 seconds, and can be clinically detected as a vasodilatation response (VR) on the flow mediated brachial artery (FMBA) test.⁷⁻⁹ Asymmetric dimethylarginine (ADMA) is a laboratory marker of endothelial dysfunction that acts as an endogen inhibitor of endothel nitric oxide synthase (eNOS) an enzyme that competes with arginine, which is a NO precursor.¹⁰

LBW incidence in Indonesia is still high of about 11.5%.¹¹ Therefore, the aim of this study is to define the effect of LBW on endothelial function represented by VR value and plasma ADMA level; and to determine the role of adiponectin on endothelial dysfunction represented by ADMA level.

METHODS

This was a clinical epidemiological study conducted in a retrospective fashion, from November 2009 until January 2010. Subjects were obtained from the growth study cohort of Tanjungsari, Sumedang District, West Java¹² who fulfilled the inclusion criteria (**Figure 1**).

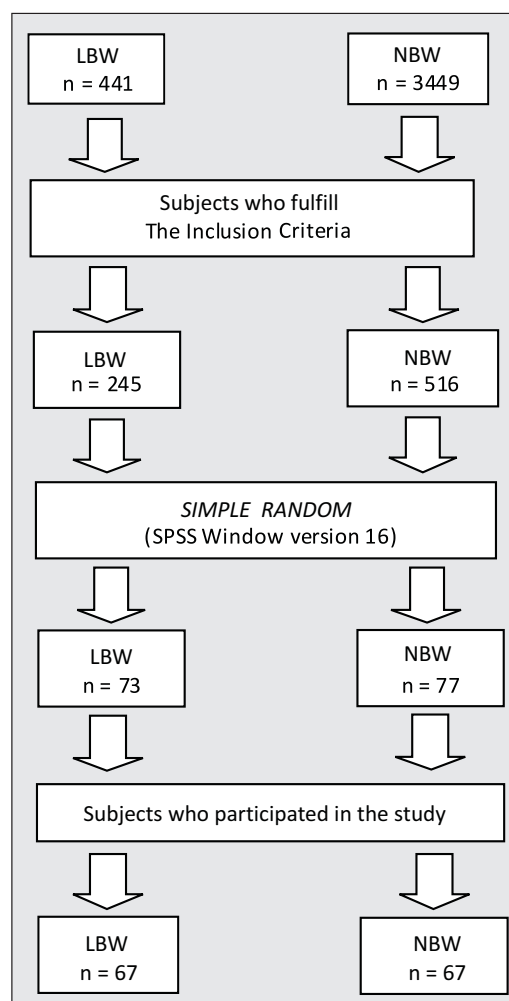


Figure 1. Subjects obtained from the growth study cohort of Tanjungsari, Sumedang District, West Java