Analisis dampak perbedaan pajanan konsentrasi oksigen awal pada resusitasi bayi prematur terhadap displasia bronkopulmonal, integritas mukosa, dan mikrobiota usus = Analysis on the impact of the difference of exposure to initial oxygen concentration in resuscitation of premature infants against bronchopulmonal dysplasia mucosal integrity and intestinal microbiota

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Abstrak

ABSTRAK
Resusitasi dengan konsentrasi oksigen yang tinggi (100%) pada bayi cukup bulan meningkatkan angka mortalitas dan morbiditas. Hiperoksia dapat meningkatkan stres oksidatif pada bayi prematur oleh karena kadar anti oksidannya yang rendah. Peningkatan stres oksidatif akan mengakibatkan inflamasi dan berhubungan dengan terjadinya displasia bronkopulmonal dan gangguan integritas usus. Pemberian oksigen yang tinggi juga akan memengaruhi mikrobiota aerob dan anaerob dalam usus oleh karena oksigen akan berdifusi dari mukosa usus ke dalam lumen usus. Belum diketahui berapa kadar FiO2 awal yang tepat pada resusitasi bayi prematur.
Penelitian ini bertujuan menelaah dampak perbedaan pajanan konsentrasi oksigen awal pada resusitasi bayi prematur terhadap displasia bronkopulmonal, integritas mukosa, dan mikrobiota usus.
Penelitian ini merupakan penelitian uji klinis acak terkontrol tidak tersamar di Ilmu Kesehatan Anak, FKUI-RSCM dan RS Bunda Menteng pada bayi prematur (usia gestasi 25?32 minggu) yang mengalami distres pernapasan yang dirandomisasi untuk diberikan resusitasi dengan FiO2 awal 30% atau 50%. Kadar FiO2 disesuaikan untuk mencapai target saturasi oksigen (SpO2) 88?92% pada menit ke-10 dengan menggunakan pulse oxymetry. Luaran primer berupa angka kejadian DBP dan luaran sekunder berupa penanda stres oksidatif (rasio GSH/GSSG dan MDA darah tali pusat dan hari ke-3), penanda gangguan integritas usus (alpha-1 antitrypsin), dan mikrobiota usus (polymerase chain reaction) pada feses hari 1?3 dan hari ke-7.
Selama periode Januari?September 2015, terdapat 84 bayi yang direkrut (masing-masing 42 bayi pada kelompok 30% dan 50%). Tidak ada perbedaan bermakna angka kejadian DBP pada kelompok FiO2 30% vs. 50%, yaitu 42,8% vs. 40,5% (intention to treat analysis) dan 25% vs. 19,4% (per protocol analysis). Juga tidak ada perbedaan bermakna penanda stres oksidatif (rasio GSH/GSSG dan kadar MDA), kadar AAT, dan mikrobiota usus pada kedua kelompok. Mikrobiota anaerob fakultatif lebih tinggi dibandingkan dengan mikrobiota anaerob pada hari ke-7 pada kedua kelompok.
Pada bayi prematur dengan usia gestasi 25?32 minggu yang diresusitasi dengan FiO2 awal 30% vs. 50% tidak dijumpai perbedaan yang bermakna angka kejadian DBP, penanda stres oksidatif, gangguan integritas mukosa usus (AAT), dan mikrobiota usus. Oleh karena itu,

pemberian FiO2 awal 30% hingga 50% selama resusitasi sama amannya untuk bayi prematur
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ABSTRACT
Resuscitation with high oxygen levels (100%) in term infants increases mortality and morbidity rates. Hyperoxia can increase oxidative stress in premature infants due to its low antioxidant level. The increased oxidative stress will cause inflammation and it is associated with the development of bronchopulmonary dysplasia (BPD) as well as intestinal dysintegrity. The administration of high oxygen levels will also affect aerobic and anaerobic intestinal microbiota as the oxygen will diffuse from intestinal mucosa into the lumen. The appropriate initial FiO2 level during the resuscitation of premature infants has not been known.
This study aims to analyze an impact on the difference of exposure to initial oxygen concentration in resuscitation of premature infants against bronchopulmonary dysplasia, mucosal integrity, and intestinal mucosa.
The study was an unblinded randomized controlled clinical trial, in Child Health Department University of Indonesia, Cipto Mangunkusumo Hospital, and Menteng Bunda Hospital in Jakarta, which was conducted in premature infants (25?32 weeks of gestational age) who experienced respiratory distress and were randomized for receiving resuscitation using 30% or 50% initial FiO2. The FiO2 levels were adjusted to achieve target oxygen saturation (SpO2) of 88?92% on the 10th minute using pulse oximetry. The primary outcome was incidence of BPD; while the secondary outcome was markers of oxidative stress (ratio of GSH/GSSG and MDA in umbilical cord blood and on the 3rd day), intestinal dysintegrity (AAT) and intestinal microbiota (using PCR) found in fecal examination on day 1?3 and on the 7th day. During the period between January and September 2015, there were 84 infants recruited (there were 42 infants in each group of the 30% and 50% FiO2). There was no significant difference on BPD incidence between 30% and 50% FiO2 groups, i.e. 42.8% vs. 40.5% (intention to treat analysis) and 25% vs. 19.4% (per protocol analysis). There was also no significant difference on oxidative stress markers (ratio of GSH/GSSG and MDA levels), AAT levels, and changes of facultative anaerobic and anaerobic microbiota in both groups. However, there was a higher level of facultative anaerobic microbiota compared to anaerobic microbiota on the 7th day in both groups.
In premature infants with 25?32 weeks of gestational age who were resuscitated using 30% vs. 50% initial FiO2 level, significant differences were found in terms of BPD incidence, oxidative stress markers (ratio of GSH/GSSG and MDA), AAT (intestinal mucosa integrity) and intestinal microbiota. Therefore, it is concluded that the administration of 30% to 50% initial FiO2 are both equally safe for premature infants during resuscitation.