

# Aktivitas enzim lactate dehydrogenase pada otot tikus yang mendapat paparan hipoksia hipobarik intermiten = Lactate dehydrogenase enzyme activity in rat muscle exposed to intermittent hypobaric hypoxia

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## Abstrak

Latar belakang: Kondisi hipoksia hipobarik intermiten sering digunakan pada pelatihan, sehingga menyebabkan tubuh kekurangan oksigen pada saat tertentu atau disebut sebagai kondisi hipoksia. Hal ini dapat memengaruhi jaringan otot karena otot merupakan salah satu organ yang bergantung pada ketersediaan oksigen untuk menghasilkan ATP. Tubuh akan melakukan berbagai mekanisme kompensasi untuk mempertahankan keadaan homeostasis melalui pengaturan HIF-1. HIF-1 akan meregulasi banyak ekspresi gen, salah satunya adalah enzim glikolitik yang mengatur metabolisme jaringan. Laktat dehidrogenase merupakan salah satu enzim glikolitik yang diatur oleh HIF-1 dan banyak ditemukan di otot sehingga diduga aktivitas enzim laktat dehidrogenase meningkat dalam kondisi hipoksia.

Tujuan: Menganalisis aktivitas enzim laktat dehidrogenase pada otot tikus yang diinduksi hipoksia hipobarik intermiten

Metode: Menggunakan uji eksperimental pada 5 kelompok tikus Wistar, yaitu normoksia, hipoksia 1 kali, hipoksia 2 kali, hipoksia 3 kali, dan hipoksia 4 kali. Hipoksia dilakukan selama 5 menit dalam hypobaric chamber dengan interval 7 hari. Biomarker hipoksia yang diukur adalah aktivitas enzim laktat dehidrogenase menggunakan LDH activity assay kit Elabscience.

Hasil: Aktivitas spesifik enzim LDH dalam keadaan normoksia ( $1167,625 \pm 120,769$  U/gprot), hipoksia 1 kali ( $1364,17 \pm 176,538$  U/gprot), hipoksia 2 kali ( $911,218 \pm 130,305$  U/gprot), hipoksia 3 kali ( $1069,153 \pm 121,685$  U/gprot), dan hipoksia 4 kali ( $1085,814 \pm 52,314$  U/gprot). Hasil ini menunjukkan tidak terdapat perbedaan signifikan antar kelompok ( $p>0,05$ ).

Simpulan: Tidak ditemukan adanya perbedaan aktivitas enzim laktat dehidrogenase antara kondisi normoksia dan hipoksia hipobarik intermiten

.....Background: Condition of intermittent hypobaric hypoxia is often used in training, this condition can cause lack of oxygen at certain times or is known as a hypoxic condition. This can affect the muscle, because muscle is one of the organs that needs oxygen to produce ATP. The body will perform various compensatory mechanisms to maintain the homeostatic state through HIF-1 regulation. HIF-1 will regulate many gene expression, one of which is a glycolytic enzyme that regulates tissue metabolism. Lactate dehydrogenase is one of the glycolytic enzymes that is regulated by HIF-1 and is found in many muscles so that it is suspected that the lactate dehydrogenase enzyme activity increases in hypoxic conditions.

Aim: to analyzed the activity of the enzyme lactate dehydrogenase in rat muscle induced by intermittent hypobaric hypoxia

Methods: Using experimental tests on 5 groups of Wistar rats, divided to normoxic group, one-time hypoxia group, two-times hypoxia group, three-times hypoxia group, and four-times hypoxia group. Hypoxia was performed for 5 minutes in a hypobaric chamber with 7 days interval. Hypoxic biomarker measured was the activity of the lactate dehydrogenase enzyme using the LDH activity assay kit Elabscience.

Results: Specific activity of the LDH enzyme in normoxic group ( $1167,625 \pm 120,769$  U / gprot), one-time

hypoxia group ( $1364,17 \pm 176,538$  U / gprot), two-time hypoxia group( $911,218 \pm 130,305$  U / gprot), three-times hypoxia group ( $1069,153 \pm 121,685$  U / gprot), and four-time hypoxia group ( $1085,814 \pm 52,314$  U / gprot). These results indicate that there is no significant difference between groups ( $p > 0.05$ ).

Conclusion: There was no difference in the activity of the enzyme lactate dehydrogenase between normoxia and intermittent hypobaric hypoxia