

Flurothyl-유발 발작 감수성에 대한 케톤생성식이요법의 효과*

Effect of the Ketogenic Diet on Flurothyl-Induced Seizure Susceptibility

김동욱¹ · 채수안² · 정기영³ · 김재문³

Dong Wook Kim, M.D.¹, Soo Ahn Chae, M.D.², Ki-Young Jung, M.D.³ and Jae Moon Kim, M.D.³

ABSTRACT

Purpose : Despite decades of clinical experience with the ketogenic diet (KD), its efficacy and mechanisms of action have been examined in few animal studies. The present study was designed to investigate the effect of a KD on flurothyl - induced seizure susceptibility in rats. **Methods** : Twenty male Sprague - Dawley rats were divided into two equal groups. Dietary treatment was initiated at P39. The experimental group was fasted for a day and then fed a KD consisting of [fat] : [protein + carbohydrate] ratio of 4.3 : 1, while the control group was fed a standard rodent chow. On treatment day 21, blood - hydroxybutyrate (BHB) levels were assayed and seizures were chemically induced by flurothyl (40 μl/min). Seizure susceptibility was defined as the latency from the start of flurothyl infusion to the onset of a generalized seizure (loss of posture with bilateral hindlimb tonic extension). Shorter latencies reflect greater seizure susceptibility. **Results** : Blood BHB levels in the KD - treated group were significantly higher than those of the control group (4.75 ± 0.38 [n=10] vs. 0.19 ± 0.02 [n=10] mM, respectively ; p<0.01). The latencies to the onset of a generalized seizure were 673.2 ± 32.95 [n=10] and 523.0 ± 31.11 [n=10] seconds for the KD - treated and control groups, respectively (p<0.01). **Conclusion** : This study demonstrates the significant decrease in the susceptibility of flurothyl - induced seizure in the KD - treated rats. Furthermore, we have established a working animal model from which future mechanistic studies can be based. (*J Korean Epilep Soc* 5 : 119-123, 2001)

KEY WORDS : Ketogenic diet · Flurothyl · Seizure susceptibility · - Hydroxybutyrate · Rat.

(high - fat, low - carbohydrate diet)
(ketogenic diet)

서 론

(fasting) (seizure) 가 1920 bromide phenobarbital
, 1921 Wilder¹⁾가 가
(ketosis) (anti- 가
epileptic efficacy) , 1938 diphenylhydantoin
(antiepileptic drug)가
(HMP - 99 - 가 1990
N - 02 - 0003) .
¹ Department of Pediatrics, Inje University College of Medicine & Ilsan Paik Hospital, Goyang, Korea
² Department of Pediatrics, Chung-Ang University College of Medicine, Seoul, Korea
³ Department of Neurology, Chungnam National University College of Medicine, Daejeon, Korea
교신저자 : , 411 - 706 2240 가 (antiepileptic therapy)
TEL : (031)910 - 7106 · FAX : (031)910 - 7108 .
E - mail : dwkim@ilsanpaik.ac.kr 가

(animal model) 가
(antiepileptic mechanism)

대상 및 방법

39 Sprague - Dawley 20
10
(ketogenic diet group)
(control group) 2
20 [] : []
+] 4.3 : 1
TD 96355(Harlan Teklad, USA)⁵⁾
21
21
(ketonemia) flurothyl -
(susceptibility)

Keto - Site test kit(GDS Diagnostics, USA)
(ketone body) - hydroxybutyrate
(BHB)

(convulsant) flurothyl(2,
2, 2 - trifluoroethyl ether, Aldrich, USA)

(33 × 17.5 × 23 cm)
flurothyl 40 µl/min

flurothyl
(
)
가
flurothyl
BHB t - test
p<0.05

결 과

21 (±)
4.75(± 0.38)
BHB
flurothyl -
mM 0.19(± 0.02) mM
(p<0.01) 가
(Table 1). flurothyl -
(±)
가 673.2(± 32.95) 523.0(± 31.11)
(p<0.01) (Table 1),
(seizure - pro-
tective effect)

고 찰

1920 1) 80
가
in vitro, in vivo
가
가

Table 1. Blood β -Hydroxybutyrate Levels and Latencies to Flurothyl-Induced Generalized Seizures

Experimental groups	β -Hydroxybutyrate (mM)	Seizure latency (seconds)
Ketogenic diet group (n=10)	4.75 ± 0.38	673.2 ± 32.95
Control group (n=10)	0.19 ± 0.02	523.0 ± 31.11
p-value	p < 0.01	p < 0.01

가 . Deca - vi - sol 0.6 ml

가 . , ,

가 . Appleton DeVivo⁸⁾⁹⁾

가 38%, (lard) 38%,

가 (vitamin - free casein) 11%, 6.8%,

6.2% - (gavage - feeding)

, Mahoney¹⁰⁾ MCT 30 g,

0.9% NaCl 70 g

가 (emulsification)

가 . Nakazawa¹¹⁾

MCT

가⁶⁾ , MCT 41.2 g%, 28.8 g%,

가 18.9 g%, 6.9 g%

80

가 . 가 .

, , , , 1964 Millichap¹²⁾

(electroshock) (hydration electro-

shock) - 가

가

가 Uhl-

emann Neims⁷⁾ 16

(dry weight) 69.8% (3 :

1) 10

1972

(high - fat diet)

가 PTZ

(maximal electroshock), bicuculline -

⁶⁾

1 가

MCT 가 (normal

diet) 3.5 . 1974 App-

leton DeVivo⁹⁾ 76% (4 :

1) -

가 Uhlmann Neims⁷⁾가

100 g, (casein) 6.6 g, (seizure threshold) 2~3

가 10~20 (seizure behavior) (seizure severity) (high - carbohydrate diet) 가 PTZ - 가 (ketogenic diet - induced metabolic adaptation) flurothyl¹⁸⁾ 5)19)20 - 22) 19) flurothyl (,) flurothyl 45 13)가 1983 Nakazawa¹¹⁾ 8~12 2 flurothyl - 가 70% , 59% 가²³⁾²⁴⁾ MCT MCT 가 가 , 가 1984 Otani¹⁴⁾ 4 7 80 (sub- 가 flurothyl - 가 PTZ 가 PTZ Bough¹⁵⁾¹⁶⁾ 중심 단어 : Flurothyl - Hydroxybutyrate PTZ - : 2001 11 30 PTZ - : 2001 12 28 17) PTZ

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