

Effects of Carbohydrate Diet Programs on Urine Ketones Positiveness with Long Time on a Diet 1 Year, 2 Years and 3 Years

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ABSTRACT

Carbohydrate diet is a diet pattern that reduces carbohydrate consumption. Therefore, the body will use fat as an alternative energy source. The continuous use of fat causes the accumulation of fatty acids so that it often causes ketone positivity in the urine. Objective : Find out the effect of a carbohydrate diet program on the positivity of urine ketones. Method : This research is an analytic observational study with a cross sectional approach. The sample used was urine from respondents who had been on a carbohydrate diet for 1 year, 2 years and 3 years, then urine ketones were examined using the dipstick method. Data analysis was carried out using the Chi-Square test with a confidence value ($\alpha = 0.05$). Result : The sample in this study amounted to 45 samples, with a total of 23 samples of positive ketones and 22 samples of negative ketones. The results of the Chi Square test obtained an Asymp. sig value of $0.009 < 0.05$ (α) which indicates that the carbohydrate diet program has a significant effect on the positivity of urine ketones.

INTRODUCTION

The carbohydrate diet or ketogenic diet was first introduced by Wilder in 1921 as a method for treating epilepsy. A carbohydrate diet is a diet that reduces carbohydrate consumption and increases fat consumption as an energy source. When on a carbohydrate diet, the body will burn fat, not carbohydrates. This state is called ketosis. When the body is in a state of ketosis, ketone positivity often occurs in the urine (Ngurah, Wahyudo, & Berawi, 2017).

Ketones are products of fatty acid metabolism consisting of 3 compounds, namely acetone, acetoacetic acid and beta hydroxybutyric acid. The presence of ketones in urine and blood is a sign from the body that the body is lacking carbohydrates and glucose as an energy source. Thus, the body will convert non-carbohydrate substances into glucose. This process is called gluconeogenesis (Soraya, 2017).

Ketones will be produced by the liver under normal circumstances as a result of fatty acid metabolism. When fatty acid levels increase, fatty acids will enter the liver resulting in a β -oxidation process that produces acetyl-CoA, NADH and ATP. The NADH produced by helps drive oxaloacetate into malate. The small amount of available oxaloacetate is then catalyzed by citrate synthase and causes accumulation of acetyl-CoA.

The two acetyl-CoA molecules that are formed will react to produce acetoacetyl CoA through the reversal of the thiolase reaction. Another acetyl-CoA will react with acetoacetyl

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CoA to produce 3-hydroxy-3-methylglutaryl CoA and liberate CoA which does not experience aciliated. The catalyst in this reaction is the enzyme HMG-CoA synthase. Next, the HMG-CoA cleavage reaction will occur by HMG-CoA lyase to form acetyl-CoA and acetoacetate.(Asma Naqibatul Husna, 2021).

The production of excess acetoacetic acid which accumulates above normal levels will be converted to acetone and the presence of carbon dioxide will form beta hydroxybutyric acid. These three compounds are known as ketone bodies. This happens because the Krebs cycle works more optimally as a result of an increase in acetyl-CoA which will stimulate mitochondria to activate ketogenesis.(Soraya, 2017). Ketogenesis generally occurs when carbohydrate stores decrease drastically, such as when on a carbohydrate diet.(Jiwantoro & Jannah, 2019).

The large number of people who are interested in losing weight by doing a carbohydrate diet in Indonesia has motivated several people to form a community that focuses on carbohydrate diet programs. One of them, in Cakranegara District, Mataram, West Nusa Tenggara, has established a club that advocates implementing a carbohydrate diet for its members. This club has \pm 45 members consisting of men and women, in their teens to adults with a time span of 1-3 years on a carbohydrate diet. Based on this description, the authors are interested in conducting research on the Effect of Carbohydrate Diet on the Positivity of Urine Ketones with a Long Diet of 1 Year, 2 Years and 3 Years. It is hoped that the results of this study can provide information about dietary carbohydrates and their effect on urine examination

METHODS

This research is an analytic observational study with an analytic observational approach to determine the effect of a carbohydrate diet program on urine ketone positivity. The sample size is 45 samples divided into 3 groups. The tools used in this study were sample pots, dry tissue and ketone examination strips. The data obtained by measuring the positivity of urine ketones using the strip dip method is presented in tabular form. Data were analyzed by Chi-Square statistical test with a 95% confidence level (Jiwantoro, 2017).

RESULTS AND DISCUSSION

The study was conducted by dividing 45 respondents into 3 groups, group 1 year on diet, group 2 years on diet and group 3 years on diet. This aims to determine the effect of a carbohydrate diet program on the positivity of urine ketones. The sample used is a random urine sample from the respondent. The sample is then checked for urine ketones using a ketone test strip.

Table 1 Examination Results for Urine Ketones in Respondents Who Have Been on a Carbohydrate Diet for 1 Year.

Sample Code	Check up result	
	Positive	Negative
KT030		(-)
KT031		(-)
KT032	(+)	
KT033		(-)
KT034		(-)
KT035	(+)	

Sample Code	Check up result	
	Positive	Negative
KT036		(-)
KT037		(-)
KT038		(-)
KT039	(+)	
KT040		(-)
KT041		(-)
KT042		(-)
KT043		(-)
KT044	(+)	
KT045		(-)
Amount	4	12

Based on the results of table 1, it is known that there were 4 positive ketone samples out of a total of 16 samples in respondents who had been on a carbohydrate diet for 1 year.

Table 2. Results of examining urine ketones in respondents who have been on a carbohydrate diet for 2 years.

Sample Code	Check up result	
	Positive	Negative
KT016	(+)	
KT017		(-)
KT018		(-)
KT019		(-)
KT020	(+)	
KT021		(-)
KT022	(+)	
KT023		(-)
KT024		(-)
KT025	(+)	
KT026	(+)	
KT027	(+)	
KT028		(-)
KT029	(+)	
Amount	7	7

Based on the results of table 2, it is known that there were 7 positive ketone samples out of a total of 14 samples in respondents who had been on a carbohydrate diet for 2 years.

Table 3 Results of Examination of Urine Ketones in Respondents Who Have Been Doing a Carbohydrate Diet for 3 Years.

Sample Code	Check up result	
	Positive	Negative
KT001	(+)	
KT002	(+)	

Sample Code	Check up result	
	Positive	Negative
KT003	(+)	
KT004	(+)	
KT005	(+)	
KT006	(+)	
KT007	(+)	
KT008	(+)	
KT009	(+)	
KT010	(+)	
KT011	(+)	
KT012	(+)	
KT013		(-)
KT014		(-)
KT015		(-)
Amount	12	3

Based on the results of table 3, it is known that there were 12 positive ketone samples out of a total of 15 samples in respondents who had been on a carbohydrate diet for 3 years.

Table 4 Statistical Test Results

	Value	df	asympt. Sig. (2-sided)
Pearson Chi-Square	9.382	2	.009

Based on the statistical results, it shows a p-value of $0.009 < \alpha$ which means that there is an effect of the carbohydrate diet program on the positivity of urine ketones. This study used 45 respondents who had been on a carbohydrate diet for 1 year, 2 years and 3 years, and had agreed or signed informed consent as a statement that the respondents were willing to follow this research procedure.

According to the length of time on the diet, out of 45 respondents, 15 of them went on a diet for 3 years, 14 people went on a diet for 2 years and 16 people went on a diet for 1 year. This is in accordance with the data that the authors obtained when submitting a questionnaire before the respondent signed an informed consent. Based on this, it can be seen that currently many people have an interest in going on a carbohydrate diet, apart from being a means to lose weight as well as a healthy lifestyle through a balanced diet program.

The results of examining urine ketones on 45 respondents obtained the highest ketone value of (+1) or equivalent to 9 mg/dL and the lowest ketone value, namely negative (-). In this study, the highest ketone positivity was only (+1) or equivalent to 9 mg/dL because the respondents had a balanced portion of carbohydrate diet, namely 30% carbohydrates, 30% fat and 40% protein. Statistically using the Chi Square test showed a significant difference with an Asymp.Sig value of 0.009, so it can be said that the carbohydrate diet program has an effect on the positivity of urine ketones.

The carbohydrate diet program has an effect on the positivity of urine ketones. When the body loses energy sources, the body will automatically use alternative energy sources such as fat. Excess fat metabolism in the body will cause a buildup of fatty acids and produce ketone bodies. This often results in positive ketone bodies in the urine (Hutagalung, 2014).

Other factors that cause positive ketones in the urine are pregnancy, diabetes mellitus and consuming vitamin C. The presence of ketones in the urine (ketonuria) usually occurs in pregnant women with hyperemesis gravidarum disorder which is characterized by nausea, vomiting and difficulty eating. This causes metabolism in the body to be disrupted and causes complications as well as hypokalemia, dehydration, weight loss of up to more than 5% and ketonuria. In this condition the body will metabolize fat so that there will be an increase in ketone levels in the urine (Karmila, Mongan, & Rambert, 2019).

Based on the results of this study, it was found that there were significant results on examining urine ketones in respondents who had been on a carbohydrate diet for 1 year, 2 years and 3 years. So, statistically it can be said that there is an effect of a carbohydrate diet program on the positivity of urine ketones.

CONCLUSION

Based on the research that has been done, it can be concluded that there is an effect of a carbohydrate diet program on the positivity of urine ketones.

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