The Effects of Blood Sugar (Glucose) Metabolism on the Sleep and Memory via Diet and Medicine Therapy in Ahwaz Diabetic Patients

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Abstract

This study was aimed to examine the effects of blood sugar (glucose) metabolism on the sleep memory in diabetic patients from Ahwaz metropolitan. The sample subsumed 90 diabetic patients from Ahwaz metropolitan whom were selected via systematic random sampling. The patients were allocated to three groups (two experimental and one control groups); the medical treatment or medicine therapy group (hospitals clients) diets therapy group and the control group (from “Diabetic Patients Association of Khuzestan Province” registered patient members). The experimental groups blood sugar (glucose) metabolisms (the independent variable) were manipulated by insulin treatment / insulin injection in medical therapy group and in diet therapy group through diet treatment training. Kimkarad Visual Memory Test. Immediate Auditory Memory Test and Groningen Sleep Quality Scale were implemented to collect data. Based on Multivariate Analysis of Variance (MANOVA) as applied statistical method the outcome results revealed that: devious management of the blood glucose level through insulin injection and diet therapy improved sleep and audible and visual short term memory .mid term and long term memories in diabetic patients.

Keywords: Blood sugar (glucose) metabolism. Medicine therapy (insulin injection). Diet therapy sleep and memory

Introduction

In this paper we present between field researches. Our research is concern with investigation of impacting neurotransmitters, especially the probable moderate variable, that seems to be Glucose. Glucose is one of the most importance carbohydrates that play an essential role in cells nutrition. One of the familiar glucose roles is its impacting on the sleep. We experience that effect daily, for example foods like diary product, meats, and vegetables causes’ sleepy state. All mentioned food has reducer effect on glucose level (Jonson1991). So it’s appearing that, there is relationship between a glucose level and sleepy state. On the other hand the researches demonstrate the relation between a memory and glucose level. In one side, this study with practical and fundamental vision is trying to discover the other Glucose function, in other side we try to help the people who has insomnia and weak memorize. This research tries to solve the problems without a drug. According to above subjects, it purchased below theories.

H1: blood sugar (glucose) metabolism has positive impact on the sleep in the diabetic patients through medical and diet therapy (diet therapy treatment)

H2: blood sugar (glucose) metabolism positively impacts the memory in diabetic patients through medical (insulin injection) and diet therapy (diet treatment training).

H3: there are differences between two treatment methods: diet and medical therapy.
**Materials and methods**

Statically population included all diabetic patients in Khuzestan Province. The sample inclusive 90 diabetic patients who registered with diabetic patients Association of Khuzestan province. They were selected via way systematic random sampling replaced in three groups. Medicine therapy group* diet group and control group. The first group, blood glucose (independent variable) that included 30 subjects was manipulated by curing drug.

The second groups were 30 diabetic patients that diet treatment training tutored by nutrition expert was applied as blood sugar (glucose) metabolism manipulating for this group.

The third group mentioned as control group received no any practice of blood sugar (glucose) metabolism manipulating therapeutics (independent variable).

The rate blood sugar determined via tow tests, 1. fasting plasma glucose test (FPG) 2. Oral glucose tolerance test (OGTT).

**With the FPG test**, a fasting blood glucose level between 100 and 125 mg per deciliter (mgdl⁻¹) signals pre-diabetics. A person with fasting blood glucose level of 126 mg/l or higher has type 2 diabetics.

**In the OGTT**, once blood glucose level is measured after fasting and two hours after drinking a glucose-rich beverage. If the 2 h blood glucose level is between 140 and 199 mgdl⁻¹, the person tested has pre-diabetes if the two hours blood glucose level is at 200 mgdl⁻¹ or higher, the person tested has type 2 diabetes. The normal range is 70 to 110 mgdl⁻¹.

**Groningen sleep Quality Scale (GSQS)**

Groningen Sleep Quality Scale is a self report inventory with the maximum score of 14 that symptomatize a total insomnia and the minimum score of 0 which indicates a normal sleep. This test for once used by khalafi and shahbazin and they reported demonstrated validity this test 0.82 and reliability via alpha Cranach 0.65.

In present research it optioned a validity of 0.087 and a reliability %70 via alpha Cranach.

In general, if sleep is undisturbed, subjects score 0 to 2 points a higher score (6to7) indicates a disturbed sleep.

The first question does not count for the total score. One point if answer is true: question 2,3,4,5,6,7,9,11,13,14 and 15. On point if answer is false: question 8, 10 and 12.

Kimkarad visual memory test (kvmt): Kim karat visual memory test is one of the most valid tests for measuring visual memory that is worldwide implemented in the research of visual memory issues.

Immediate auditory memory test (iamb): immediate auditory memory test was utilized to scale audile short term memory in the current research.

To put the research into practice for both experimental groups and the sole control group the following details followed on.

**Results**

As the results show (table1), the experimental groups and the control group significantly differ with respect to sleep (f=13 and p0.0001). so the first hypothesis was confirmed. That means blood sugar (glucose) metabolism as dependent variable reduces insomnia and improves the sleeping of the patients subjects.

Once you have determined that differences exist among the means, post hoc can determine which means differ. Hence, Tokay post hoc test was implied for comparisons of means differences (table2). So it could be concluded that blood sugar (glucose) metabolism has positive impact on the sleep in diabetic patients through medical therapy (insulin injection) and diet therapy (diet treatment training).
There is also statistically significant difference between experimental groups (groups included subjects received blood glucose metabolism manipulating) and control group refer to all types of inquired memories (table 1).

<table>
<thead>
<tr>
<th>Table1</th>
<th>Table2</th>
<th>Table3</th>
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<tr>
<td>Table1: Univariate variance analysis of pre test and post test differences on sleep and memories (audile, visual, short,mid and long term) for experimental and control groups</td>
<td>Table2: Turkey’s post hoc test for comparisons of means differences (pre and post tests) of insomnia scores in diabetic experimental and control groups patients</td>
<td>Table3: Turkey’s post hoc test for comparisons of means differences (pre and post tests) of the all investigated mentioned memories scores in diabetic experimental and control groups patients</td>
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<tr>
<td>The sum of squares</td>
<td>Group</td>
<td>Mean difference</td>
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<tr>
<td>Mean of squares</td>
<td>F</td>
<td>First groups</td>
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<tr>
<td>insomnia</td>
<td>13521.91</td>
<td>2</td>
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<tr>
<td>Audile short term memory</td>
<td>335.97</td>
<td>2</td>
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<tr>
<td>Visual short term memory</td>
<td>416.41</td>
<td>2</td>
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<tr>
<td>Midterm memory</td>
<td>546.94</td>
<td>2</td>
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<tr>
<td>Long term memory</td>
<td>694.4</td>
<td>2</td>
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</table>

Therefore the second hypothesis was reconsolidated too. In another words blood sugar metabolism manipulating positively impact the memory in diabetic patients through the two treatment methods; medical therapy and diet therapy.

To determine which means differ for each type of the inquired memories, post hoc test was applied. The finding indicated that experimental groups and control groups and control group were significantly different in all kinds (audile short term memory, midterm memory and long term memory) of memories except visual short-term memory (table 3).

There exist significant differences between the two experimental groups with regard to sleep and the all examined types of memories. The results exceeded for the medical therapy method compare to diet therapy. Thus the third hypothesis was affirmed too. That means: there is difference between the two treatment methods: medical therapy and diet therapy.

DISCUSSION

H1: blood sugar (glucose) metabolism has positive impact on the sleep in the diabetic patients through medical and diet therapy (diet therapy treatment training).

Serotonin is a neurotransmitter that extends the NRAM sleeping. Researches also have shown that acetylcholine increases RAM sleeping. As result it may be concluded that via either insulin injection or increment after receiving carbohydrate foods, the amount of serotonin and acetylcholine grow up in the brain and ultimately serotonin extend the sleeping and acetylcholine increases RAM sleeping.
The other explanation that may be taken into consideration is that: as various researches demonstrate that eating carbohydrate foods such as amylaceous, bread, grains and act causes insulin level increment. With insulin increment amino acids which are competitive the serotonin will reduces. So the rate of serotonin impacting in brain will increase. As result eating carbohydrates will causes the insulin increment thus causes the sleepy state.

It may generally be discussed that any of glucose metabolism regulating process such as normal insulin secretion, injection, glycogen sis (the formation or synthesis of glycogen) and glycol sis (converting glucose to lactic acid), drive the organism to either compensate the consumed energy or storage glucose which may be metabolized by the body to satisfy its energy needs in coming activities. In such condition it appears that the organism initiates sleepy mode to counterbalance and reason the last energy this may be why we experience sleepingness after either daily work exhaustion or an intensive mental effort or after having heavy food and glucose controlling edible such as dairy and meat.

**H2**: blood sugar (glucose) metabolism positively impacts the memory in diabetic patients through medical (insulin injection) and diet therapy (diet treatment training).

To explain the impact of blood sugar metabolism manipulating on short term memory w may notify the most important feature of short term memory that is the attention and on the other hand the salient diabetics’ patient’s characteristics such as impatience in insulin and blood sugar. Receiving insulin via injection and balancing blood sugar by diet therapy decrease the impatience and inattention in diabetic patients and consequently improve the short-term memory in the patients. The results reconfirmed findings in the increment of serotonin that extends the sleeping, in regulation of neurotransmitter release, neorupted secretion the cognition-enhancing effects of insulin and learning experiences on early stage of memory formation reported by Zhou et al.(2001), Bhattacharya and Saraswati (1991), Figlewicz and Szot (1991), Jonas et al. (1997), Kern et al. (1999, 2001), Park et al. (2000) and Zhao et al. (1999), respectively.

**H3**: there are differences between two treatment methods: diet and medical therapy.

There exist significant differences between the two experimental groups with regard to sleep and the all examined type of memories. The result exceeded for the medical therapy method compare to diet therapy. Thus the third hypothesis was affirmed too.

To explain the significant differences between the medical and diet therapy, we may point out to the circumstances that must be considered in both procedures. In the first treatment procedure, devious management of the blood glucose level (as independent variable) through insulin injection supervised and processed by MD product specialist physician and according to a routine schedule based on accurate medical treatment principals. As a sugar (glucose) metabolism were manipulated in a precise manner and under exact in vitro conditions. While in the diet therapy which was basically emerged and resulted from diet treatment training sessions, serving as starting point, many of variables such as forgetting, lapse, non accurate and incorrect learning because of low education of many of the patients, misperformance of the direction of the given instruction by the patients, in spite the proceeding follow up session to reduce suppressor, moderator, and disturbing variables; were less controlled. Consequently it may be concluded that the reason for advancing the exceeding result of the medical therapy treatment and the comparative preference of the medical therapy and comparative preference of medical therapy method as obvious management of blood glucose level through insulin injection camper diet therapy was due to a beneficial factor or combination of factors of more controlling and reducing the suppressor, moderator, and disturbing variables.

**References**


