3. INFORMATION ABOUT THE RESEARCH

Purpose and Significance of the Research:

Glycogen Storage Disease Type 1 (GSD1) is a rare disease that occurs with the disruption of carbohydrate metabolism due to genetic mutations in the glucose-6-phosphatase enzyme or glucose-6-phosphate transporter protein (1,2). GSD1 leads to the dysfunction of glycogenolysis and gluconeogenesis reactions, causing metabolic complications such as hypoglycemia, lactic acidosis, hyperlipidemia, and hyperuricemia (3). GSD1 may cause long-term health problems such as liver enlargement, kidney dysfunction, and neurological diseases (4,5). GSD1 includes subtypes 1a and 1b. While Type 1a results from glucose-6-phosphatase enzyme deficiency, type 1b is associated with disruptions in the glucose-6-phosphate transporter protein. In Type 1b patients, in addition to known GSD symptoms, disorders in immune system function and recurrent infections can also be observed (6). While the general incidence of GSD is estimated as 1 case in 20,000 to 43,000 births, the prevalence of GSD1 is stated in the literature as 1 in 100,000 births (2). At the same time, GSD 1b constitutes 12% to 15% of GSD1 cases (1). Similarly, both subtypes may present in childhood with episodes of severe hypoglycemia and metabolic acidosis. If metabolic balance is impaired, these symptoms may turn into complications such as hepatic adenomas and renal failure over time (1,7).

In GSD1 disease management, regular monitoring of blood and urine biomarkers is of importance both for evaluating disease progression and observing the response to treatment. As a result of impaired glucose-6-phosphate metabolism, lactate and triglyceride levels increase, while uric acid increase may lead to hyperuricemia (3,4). Elevations in Alanine aminotransferase (ALT) and Aspartate aminotransferase (AST) levels, which are liver function indicators, may reflect the degree of hepatic glycogen accumulation (8).

The urinary glucose tetrasaccharide (Glc4) level has stood out as a promising biomarker in recent years, especially in GSD1 management. Glc4, a glycogen breakdown product, shows a positive correlation with liver glycogen content (3). An increase in the urinary Glc4 ratio may indicate that metabolic activities are impaired and that glycogen accumulation is excessive. Reducing Glc4 levels through dietary interventions is considered an important indicator of treatment efficacy (9). Studies conducted have revealed that Glc4 levels show a positive correlation with the liver enzymes ALT and AST, but have no significant relationship with the creatine kinase (CK-MM) isoform type (8). This situation shows that Glc4 provides information regarding liver glycogen metabolism, but is less affected by muscle-derived processes. This role of Glc4 in GSD1 patients can be used to monitor metabolic balance and develop individualized approaches in treatment planning.

Traditional treatment approaches in GSD1 patients aim to keep blood glucose levels in balance using frequent meals and long-acting glucose sources such as raw cornstarch (4,10). However, incorrect adjustment of carbohydrate intake may lead to complications such as hypoglycemia or excessive glycogen accumulation (11). The carbohydrate counting (CC) method has the potential to prevent such fluctuations by precisely regulating carbohydrate consumption according to energy needs. Carbohydrate counting is a widely used method in diabetes treatment and allows individuals to contribute to blood glucose regulation by controlling their carbohydrate intake. Studies conducted in diabetes treatment show that the CC method improves glycemic control and reduces HbA1c levels (12). Similarly, regulating carbohydrate intake with this method in GSD1 patients may contribute to establishing metabolic balance. Studies examining the urinary Glc4 parameter related to the amount of glycogen accumulated in the body have generally been conducted with GSD Type 2 (Pompe Disease), as well as patients with Type 3, Type 6, and Type 9 (13). Regulating Glc4 as a biomarker plays a critical role in improving metabolic control and monitoring treatment efficacy (9). It is considered that the CC method reduces urinary Glc4 levels by regulating glycogen metabolism in GSD1 patients.

Quality of life in GSD1 patients can be seriously affected due to the strict dietary practices of the disease and the limitation of innovative treatment methods. The necessity of nocturnal feeding and continuous blood glucose control can make patients' daily lives difficult and create psychological stress (14). The CC method may allow patients to participate more actively in their social lives by providing flexibility in dietary planning. The fact that CC increases individual autonomy and reduces treatment-related stress are potential benefits that could positively affect quality of life (15). However, during implementation, the patient's adherence to CC principles and its efficacy in practice must be monitored carefully.

Research regarding CC in GSD1 management is limited. In particular, studies conducted on the use of innovative biomarkers such as Glc4 are of great importance in evaluating the potential benefits of this method (3,8). However, no study has been found in the literature regarding the relationship between CC and Glc4 in GSD1 patients. With this study, it is aimed to make significant contributions to the literature through the monitoring of Glc4 levels and the integration of the CC method into disease management.

Since the study is a doctoral dissertation, it is of importance that it has original value in the scientific literature. There are a limited number of studies in which the urinary Glc4 parameter is used in patients diagnosed with GSD Type 1 (8,9). With this study, a contribution will be provided to the limited scientific literature conducted with GSD Type 1 patients in which the urinary Glc4 parameter is controlled. It is considered that original value is added to the study with this feature. Furthermore, in the current medical nutrition therapy applied by healthcare professionals to patients diagnosed with GSD Type 1, blood glucose regulation is targeted; in this context, regular snacks and consumption of a designated amount of carbohydrate (CHO) per meal are recommended. However, in practical application, the amount of CHO per meal is determined by the healthcare professional, a nutrition program is created according to the CHO amount, but the patient's dietary diversity remains at a limited level. In this study, just as in diabetic individuals, providing diversity in the medical nutrition therapy diet list with the CC method and the effect of this diversity on the patient's quality of life are emphasized. This is another original value of the study. Finally, no study could be found in the literature regarding the effect of the CC method on the levels of accumulated glycogen in the bodies of participants. In this study, the mentioned effect will be examined with the urinary Glc4 parameter. This is another feature that gives original value to the study.

The aim of the study is to investigate the effect of carbohydrate counting education to be administered to pediatric patients diagnosed with glycogen storage disease Type 1a and Type 1b on patients' blood glucose regulation, quality of life, urinary Glucotetrasaccharide (Glc4) levels, and various biomarkers.

Materials and Methods:

Type of research: It is a single-group pre-test post-test design quasi-experimental intervention study. There is no control group in the study. The study will be conducted with a single group. The effect of the educational intervention to be carried out using the Nutrition and Carbohydrate Counting Education Form will be determined by questionnaire form, Pediatric Quality of Life Inventory (PedsQL), Carbohydrate Counting Knowledge Level Form (pre-test and post-test), and collection of dietary intake records.

Population and sample: While calculating the sample size, the study of Şanlı et al. (16) conducted with 9 participants was taken as a reference, and by using version 3.1.9.7 of the G*Power program, with a 5% margin of error, 80% power level, and according to the 0.88 effect size calculated using the p=0.042 statistical significance value in the HbA1c (%) parameter change, the required sample size for the Wilcoxon signed-rank test was calculated as at least 13 participants. In the referenced study (16), by intervening in the fiber consumption of participants, which is a carbohydrate, the amounts consumed were determined and the effect on metabolic parameters in patients diagnosed with GSD Type-1 was examined. Differently from that study, similar biomarkers will be evaluated with the differences that may occur through education in the amount of consumed carbohydrate and meal distribution. The study will be conducted with at least 13 participants and will be carried out with a single group.

Inclusion criteria:

- Participating voluntarily in the research
- Being in the age range of 2–18 years
- Being diagnosed with Glycogen Storage Disease Type 1a or Type 1b
- Using raw cornstarch

Exclusion criteria:

- Having received carbohydrate counting education previously
- Being diagnosed with one or more of Diabetes (Type 1 or Type 2), chronic renal failure, or liver diseases not associated with metabolic etiology
- Having undergone liver transplantation
- Having cardiac, muscular, or skeletal system abnormalities
- Illiteracy of participant or parent/caregiver
- Having a health issue precluding answering study questions
- Continuing to be fed with breast milk
- Using slow-release modified starch (Glycosade, etc.)
- Patients fed via non-oral routes (such as PEG, NG)

Start and end time of research: September 2025 – September 2026
Information on the location where research will be conducted: Ankara Etlik City Hospital Children's Hospital Metabolic Diseases Outpatient Clinic
Information on how participants will be reached: Face-to-face, voice calls by phone, and remote video call applications (Zoom, etc.).

Forms used in data collection:

Questionnaire Form: The study's questionnaire form consists of six sections. The first section titled "General Information" consists of 15 questions providing general information about the participant and parent/caregiver individuals. In the second section titled "Health Status Information", there are 17 questions covering health information of participants associated with glycogen storage disease. The third section titled "Nutritional Habits Information" consists of 14 questions regarding nutritional habits of participants. In the fourth section, various anthropometric measurements of participants and retrospective radiological evaluations to be retrieved from patient charts are located. In the fifth section, there is the 24-hour dietary intake record form in which eating and drinking activity within the last 24 hours of the participant and adherence to medical nutrition therapy will be evaluated. In the sixth section, routine blood and urine parameters checked by the physician will be recorded from the patient chart.

Pediatric Quality of Life Inventory (PedsQL): Quality of life of children was measured using the Pediatric Quality of Life Inventory (PedsQL) - Quality of Life Questionnaire. PedsQL was developed in 1999 by Varni and colleagues to measure quality of life in children aged 2–18 years (17). The validity and reliability study of the Pediatric Quality of Life Inventory in Turkey was conducted in 2007 by Nursu ÇAKIN MEMİK and colleagues (18). This scale was prepared separately for four different age groups as 2–4, 5–7, 8–12, and 13–18 years. The scale consists of four sub-sections for each age group evaluating emotional, physical, social, and school-related functioning. There are 4 items in the emotional section, 8 in physical, 5 in social, and in school-related questions 3 items in the 2–4 age group and 3 items in the other three age groups. The scale consists of five-point Likert-type responses (0=Never, 1=Almost Never, 2=Sometimes, 3=Often, 4=Almost Always). Responses given to items are linearly transformed as 0=100, 1=75, 2=50, 3=25, 4=0. The scores of 8 items in the physical section are linearly transformed, summed, and divided by 8 to reach the physical health summary score (PHSS). The psychosocial health summary score (PSHSS) is reached by linearly transforming and summing scores of the 5 emotional items, 5 social items, and 5 school items, and dividing by 15. The total scale score (TSS) is determined by linearly transforming, summing all scale items, and dividing by 23. Higher scores indicate better health-related quality of life. Cronbach alpha internal consistency was determined as 0.93.

Carbohydrate Counting Knowledge Level Form: Consists of 20 questions administered only to parents/caregivers of 2–11 age participants, and to both participant and parents/caregivers for 12–18 age group. It contains multiple-choice and open-ended questions querying healthy nutrition principles, nutrients, food groups, label reading, and calculating carbohydrate amounts of menus/foods specified with kitchen measures (water glass, tablespoon). There is no cut-off score. It is used as pre-test and post-test.

Nutrition and Carbohydrate Counting Education Form: Explained to parents/caregivers of 2–11 age group, and to both participants and parents/caregivers for 12–18 age group. Covers healthy nutrition, nutrients, food groups, label reading, kitchen measures, amounts (g, mL), sample menus, calculation methods, and basic dietary tenets for GSD1.

Information regarding the research workflow process:

Patient applications to the hospital where research will be conducted are made via the Central Physician Appointment System (MHRS). Within outpatient clinic workflow, patients are invited to the hospital for routine control after approximately 3 months. The 2nd and 5th stages of the research will be carried out face-to-face at the hospital in line with participants' MHRS appointments, and the 1st, 3rd, and 4th stages will be carried out using telephone interview methods.

Stage 1: Individuals previously diagnosed with GSD Type 1 who will come by obtaining an MHRS appointment randomly to the unit where the research will take place will be called by phone two weeks prior to appointment dates by responsible investigator Prof. Dr. Mustafa KILIÇ, informed about the research, and verbal assent/consent will be obtained. Following consent, the Pediatric Quality of Life Inventory (PedsQL) will be administered on the phone by the investigator.

Stage 2: Two weeks later, as a result of physician examination for patients arriving at their MHRS appointment, routine blood and urine tests within diagnosis and treatment will be performed by the physician. Subsequently, for participants consulted to the diet clinic by the physician for GSD Type 1 medical nutrition therapy, after written consent is obtained by co-investigator Dietitian Şükrü Arman AKSOY, sequentially: questionnaire form administration, PedsQL administration, taking anthropometric measurements and retrospective radiological evaluations from patient chart, taking retrospective 24-hour dietary intake record (DIR), administering Carbohydrate Counting (CC) Knowledge Level Form as pre-test, providing education using the CC Education Form, administering CC Knowledge Level Form as post-test; thereafter, Stage 2 of research will be completed via face-to-face interview method. In Stage 2, participants will be given the CC Education Form and informed that it should be used in refresher educations to be applied in subsequent stages.

There will be a 4-week period between Stages 2 and 3. In this period, once a week, retrospective 24-hour dietary intake records will be obtained from participants a total of 3 times via telephone calls.

Stage 3: In this stage where the telephone interview method will be used, sequentially: PedsQL administration, taking retrospective 24-hour DIR, administering CC Knowledge Form as pre-test, providing CC Refresher Education using the CC Education Form, administering CC Knowledge Form as post-test; thereafter, Stage 3 will be completed.

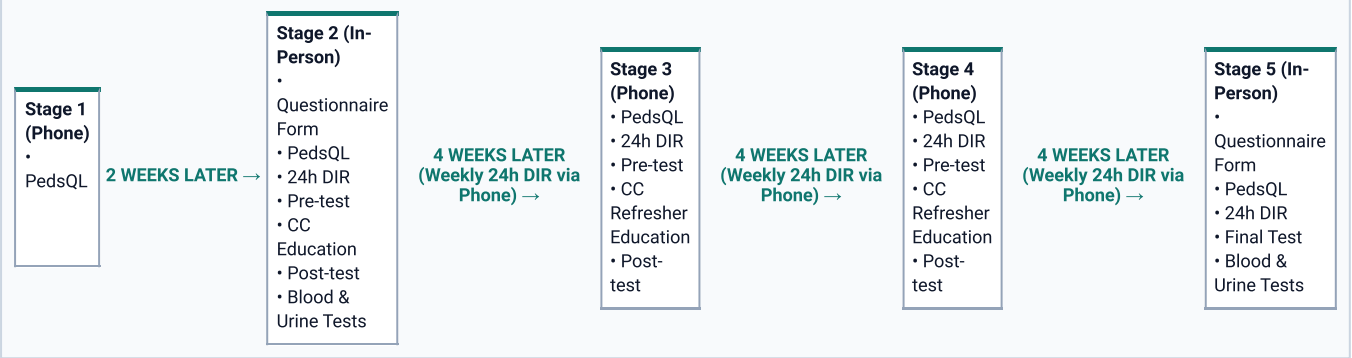
There will be a 4-week period between Stages 3 and 4. In this period, once a week, retrospective 24-hour DIR will be taken 3 times via phone calls.

Stage 4: In this stage, exactly the works and procedures applied in Stage 3 will be applied via telephone interview method.

There will be a 4-week period between Stages 4 and 5. In this period, once a week, retrospective 24-hour DIR will be taken 3 times via phone calls.

Stage 5: As a result of physician examination of patients arriving at their MHRS appointment for routine control, routine blood and urine tests within diagnosis and treatment will be performed by the physician. Subsequently, for participants consulted to the diet clinic for GSD Type 1 medical nutrition therapy, by co-investigator Dietitian Şükrü Arman AKSOY sequentially: questionnaire form administration, PedsQL administration, taking anthropometrics and retrospective radiology, taking 24-hour DIR, administering CC Knowledge Level Form; thereafter, the 5th and final stage of research will be completed via face-to-face interview.

DATA COLLECTION RESEARCH PLAN (WORKFLOW DIAGRAM)



Statistical Method(s):

IBM SPSS (25.0) will be used for evaluating data obtained in research. Continuous variables obtained by measurement (quantitative variables) will be presented with mean, standard deviation, and where necessary with median, minimum, and maximum values; categorical variables (qualitative variables) will be presented with frequency and percentage values. Conformity of quantitative variables to normal distribution will be examined with Kolmogorov-Smirnov or Shapiro-Wilk test. In variables with normal distribution: Independent Sample t-test in statistical comparisons of two independent groups, and One-Way Analysis of Variance (ANOVA) along with Tukey Multiple Comparison Test in comparisons of three or more groups will be used. In statistical evaluation of non-normally distributed variables: Mann-Whitney U-test in two-group comparisons, and Kruskal-Wallis H test along with Bonferroni-corrected Mann-Whitney U-test in comparisons of three or more groups will be used. Relationships between variables will be examined with Pearson correlation or Spearman correlation analysis. Logistic regression will be used to obtain relative risk in the presence of multiple variables. In all statistical analyses, $p<0.05$ will be accepted as statistical significance level. With version BEBİS-9 of the Nutrition Information System (BEBİS) program, macro and micro nutrient amounts of participants' food consumption records will be determined and nutritional status will be analyzed.

References:

1. Derks, T. G., et al. (2021). Nutrients, 13(11), 3828. | 2. Gümüş, E., & Özen, H. (2023). World J Gastroenterol, 29(25), 3932. | 3. Molares-Vila, A., et al. (2021). Int J Mol Sci, 22(9), 4381. | 4. Kaiser, N., et al. (2019). Mol Genet Metab, 126(4), 355-361. | 5. Bali DS, et al. (2021). GeneReviews®. | 6. Sim, S. W., et al. (2020). FEBS Lett, 594(1), 3-18. | 7. Chen, Z. Y., et al. (2019). Ann Hepatol, 17(6), 903-905. | 8. Heiner-Fokkema, M. R., et al. (2020). Genet Med, 22(11), 1915-1916. | 9. Ren, J., et al. (2023). J Chromatogr B, 1229, 123900. | 10. Şanlı, M. E., et al. (2023). J Curr Pediatr, 21:228-34. | 11. Bayram, S., et al. (2020). Ann Pediatr Endocrinol Metab, 25(3), 156. | 12. Ibrahim, S. M., et al. (2023). Cureus, 15(11), e48998. | 13. Öktem, R. M., et al. (2022). XXII. National Clin Biochem Cong. | 14. Garbade, S. F., et al. (2021). Orphanet J Rare Dis, 16, 1-10. | 15. Sobhy, G. A., et al. (2022). Pediatr Gastroenterol Hepatol Nutr, 25(4), 321. | 16. Şanlı, M. E., et al. (2023). J Curr Pediatr, 21:228-34. | 17. Varni, J. W., et al. (1999). Med Care, 37(2), 126–139. | 18. Çakın Memik, N., et al. (2007). Turk Psikiyatri Derg, 18(4), 353–363.

5. DATA COLLECTION FORM

DATE: _____/_____/_____

THE EFFECT OF THE CARBOHYDRATE COUNTING METHOD ON BLOOD GLUCOSE REGULATION, QUALITY OF LIFE, URINARY GLC4 LEVEL AND OTHER BIOMARKERS IN CHILDREN DIAGNOSED WITH GLYCOGEN STORAGE TYPE 1

Dear Participant,
This research is conducted to investigate the effect of carbohydrate counting education to be administered to patients diagnosed with Glycogen Storage Disease Type 1 on patients' blood glucose regulation, quality of life, urinary Glucotetrasaccharide (Glc4) levels, and various biomarkers. The obtained data and reached conclusions will be used solely for scientific purposes. You may withdraw from the research at any time. Thank you for your participation and contribution.

General Information:

Name surname: ……
Contact number: +90 (……) …….. - ….. - …..
Date of birth - Age (years): …./…./…….. – …..
Sex: a. Female b. Male
Participant's educational status:
a. Preschool age but not attending c. Primary school (Grades 1–4)
b. Nursery & Kindergarten d. Middle school (Grades 5–8)
e. High school (Grades 9–12)
Mother's age (years): _____
Mother's educational status:
a. Not literate c. Primary school graduate e. High school graduate
b. Literate d. Middle school graduate f. Higher education graduate
Mother's occupation:
a. Not working c. Worker e. Retired
b. Civil servant d. Self-employed f. Other (.....)

Father's age (years): _____
Father's educational status:
a. Not literate c. Primary school graduate e. High school graduate
b. Literate d. Middle school graduate f. Higher education graduate
Father's occupation:
a. Not working c. Worker e. Retired
b. Civil servant d. Self-employed f. Other (.....)
Total number of children in family: a. One b. Two c. Three d. Four and more
Which child in family: a. First b. Third c. Second d. Fourth and more
Family type: a. Nuclear Family b. Extended Family
Income status:
a. We provide our livelihood comfortably with our monthly income.
b. We provide our livelihood without serious problems with our monthly income.
c. We provide our livelihood with difficulty with our monthly income.
d. Our monthly income is not sufficient to provide our livelihood.

Health Status Information:

1. Diagnosis: a. GSD Ia b. GSD Ib
2. Age at diagnosis (years): _____
3. Is there consanguineous marriage? a. Yes b. No
4. Is there another sibling diagnosed with GSD in the family? a. Yes b. No
5. Do you have another chronic disease? a. Yes b. No
   If "Yes", write (.....)
6. Did liver adenoma develop? a. Yes b. No
7. Have you experienced bone health problems until this time? a. Yes b. No
8. Are there medications you use regularly? If yes, specify name, dose, duration:
   .....
9. What is your blood glucose measurement frequency?
   ( ) Does not measure
   ( ) Only measures when feeling bad
   ( ) Once a day ( ) Twice a day ( ) Three times a day ( ) Four and more
10. On average, how many times do you experience hypoglycemia in a 1-month period?
    a. 0 b. 1 c. 2 d. 3 e. 4 f. ≥5
11. What is your nocturnal blood glucose measurement frequency?
    a. 0–3 per month b. 1–3 per week c. 4–7 per week
12. Has there been a change in frequency of going to toilet in last 3-month period?
    a. Yes b. No If yes, explain (.....)
13. Has there been a change in your GI complaints in last 3-month period?
    a. Yes b. No If yes, explain (.....)
14. Has there been a change in bleeding complaints (epistaxis, etc.) in last 3-month period?
    a. Yes b. No If yes, explain (.....)
15. Has there been a change in infection frequency in last 3-month period?
    a. Yes b. No If yes, explain (.....)
16. Were you hospitalized due to hypoglycemia in last 3-month period?
    a. Yes b. No
17. Did ketoacidosis develop in last 3-month period?
    a. Yes b. No If yes, how many times (.....)

Nutritional Habits Information:

1. How many meals do you eat per day? a. ..... main meals b. ..... snacks
2. Do you skip meals? a. Yes b. No If "Yes", which meal: .....
3. Do you exercise regularly? a. Yes b. No
4. If "Yes" to question 3, what is exercise frequency?
   a. Every day b. 3–4 a week c. 1–2 a week d. 1–2 a month
5. If "Yes" to question 3, what is exercise type? .....
6. If "Yes" to question 3, how long is duration each time (min)? .....
7. Have you received carbohydrate counting education before? a. Yes b. No
8. Were you applying a diet for GSD before CHO counting education?
   a. Yes b. No
9. Do you do nocturnal feeding? a. Yes b. No
10. What do you prefer as nocturnal feeding?
    a. Raw cornstarch
    b. Tube feeding (NG or PEG)
    c. Other (.....)
11. Have there been situations where nocturnal feeding was unintentionally missed or delayed?
    a. Yes b. No
12. If answered "Yes" to Question 11, what is the reason?
    a. Forgot to set alarm b. Set alarm but didn't ring c. Other (.....)
13. Which of the following do you use in GSD diet treatment?
    a. Raw cornstarch b. Glycosade and/or slow-absorption modified starch
    c. Continuous tube feeding (NG or PEG)
14. Do you use precision kitchen scales? a. Yes b. No
15. Do you eat food outside home? a. Yes b. No
16. If Yes to question 15, where do you eat?
    a. Nursery-School Dining Hall/Canteen b. Workplace
    c. Restaurant/Cafe d. Other (.....)
17. If Yes to question 15, frequency of eating outside home?
    a. Never eat b. 1–3 per month c. 1–2 per week d. 3–7 per week
18. At what interval of hours do you feed at night? Specify: ..... hours/day
19. At what interval of hours do you feed during day? Specify: ..... hours/day
20. Do you use any vitamin/mineral supplement? If "Yes", specify:
    a. Yes (.....) b. No

Anthropometric Measurements and Radiological Evaluation

Anthropometric Measurements	Value
Height (cm):	
Height SDS:	
Body Weight (kg):	
Body Weight SDS:	
Body Mass Index (BMI) (kg/m²):	
BMI SDS:	
Mid-Upper Arm Circumference (cm)	
Head Circumference (cm)	
Neck Circumference (cm)	
Waist Circumference (cm)	
Hip Circumference (cm)	
Waist/Hip Ratio	

Radiological Evaluation:
Hepatomegaly: a) Present b) Absent
Hepatosteatosis: a) Present b) Absent
Splenomegaly: a) Present b) Absent
USG: _____
ECHO: _____

Dietary Intake Record Form

Name Surname: ..... Date: ..../..../.....

Meal Name	Food and Beverage Name	Used Ingredient	Amount		Leftover (%)	Net Amount Gram/mL
			Measure	Gram / mL		
Morning						
Snack						
Noon						
Snack						
Evening						
Snack						

BIOCHEMICAL PARAMETERS (DATE: ..../..../.....)

Blood Parameters			
Parameter	**Value**	**Parameter**	**Value**
HbA1c (%)		Creatinine (mg/dL)	
Fasting Glucose (mg/dL)		CRP (mg/dL)	
Insulin (mU/L)		Carnitine (µmol/L)	
Total Cholesterol (mg/dL)		Blood pH Value	
LDL (mg/dL)		Blood Gases (mmHg) ??	
HDL (mg/dL)		eGFR (mL/min/1.73 m²)	
Triglyceride (mg/dL)		AFP (Alpha fetoprotein) (µg/L)	
VLDL (mg/dL)		Calcium (mg/dL)	
ALT (IU/L)		Phosphorus (mg/dL)	
AST (IU/L)		Vitamin D (Total 25 OH) (µg/L)	
ALP (IU/L)		Vitamin B12 (ng/L)	
GGT (IU/L)		Homocysteine (µmol/L)	
Total Protein (g/L)		Ferritin (µg/L)	
Albumin (g/L)		Iron Binding Capacity	
Urea (mg/dL)		Lactic Acid (Lactate) (mmol/L)	
		Uric Acid (mg/dL)	

Urine Parameters			
Parameter	**Value**	**Parameter**	**Value**

6. BUDGET FORM

Within the scope of the research, only the urine Glc-4 parameter is not included among routine tests. After the patient's routine urine tests are studied, waste urine will be studied in the hospital laboratory for Glc-4 parameter analysis, and the analysis fee will be paid to the hospital revolving fund by the responsible investigator.

Research expenses	**Amount**
Printing of data collection forms	250 TL
Glc4 urine test fee	28,600 TL (1,100 TL/piece)
Source of expenses: All expenses of the research will be covered by the investigators.	
Responsible Investigator Prof. Dr. Mustafa KILIÇ	Signature:
Co-Investigator Dietitian Şükrü Arman AKSOY	Signature:
Co-Investigator Assoc. Prof. Dr. Sine YILMAZ	Signature:
Co-Investigator Dietitian Melike UYANIK	Signature:

7. POWER ANALYSIS

While calculating the sample size, the study of Şanlı et al. (16) conducted with 9 participants was taken as a reference, and by using version 3.1.9.7 of the G*Power program, with a 5% margin of error, 80% power level, and according to the 0.88 effect size calculated using the p=0.042 statistical significance value in the HbA1c (%) parameter change, the required sample size for the Wilcoxon signed-rank test was calculated as at least 13 participants. The bibliographic citation of the referenced research article is given below, and the full text of the article is attached in the APPENDIX.
Şanlı, M. E., Aktaş, E., İnci, A., Okur, İ., Ezgü, F., & Tümer, L. (2023). Dietary Fiber Supplementation in Type I Glycogen Storage Disease; Could it Contribute to a Better Metabolic Control?. J Curr Pediatr, 21;228-34. DOI:10.4274/jcp.2023.56255.

G*Power 3.1.9.7 Details from Application Screenshot:
Test family: t tests | Statistical test: Means: Wilcoxon signed-rank test (matched pairs) | Type of power analysis: A priori: Compute required sample size – given α, power, and effect size
Input Parameters: Tail(s): Two | Parent distribution: Normal | Effect size dz: 0.8819171 | α err prob: 0.05 | Power (1-β err prob): 0.80
Output Parameters: Noncentrality parameter δ: 3.1073139 | Critical t: 2.1912823 | Df: 11.4140856 | Total sample size: 13 | Actual power: 0.8100453

8. 3 ARTICLES RELATED TO THE TOPIC

1. **Şanlı, M. E., Aktaş, E., İnci, A., Okur, İ., Ezgü, F., & Tümer, L. (2023).** Dietary Fiber Supplementation in Type I Glycogen Storage Disease; Could it Contribute to a Better Metabolic Control? (Tip I Glikojen Depo Hastalığında Diyet Lifi Takviyesi; Daha İyi Bir Metabolik Kontrole Katkıda Bulunabilir Mi?). *The Journal of Current Pediatrics (Güncel Pediatri)*, 21:228-34. DOI:10.4274/jcp.2023.56255.
2. **Garbade, S. F., Ederer, V., Burgard, P., Wendel, U., Spiekerkoetter, U., Haas, D., & Grünert, S. C. (2021).** Impact of glycogen storage disease type I on adult daily life: a survey. *Orphanet Journal of Rare Diseases*, 16:371, 1-10. https://doi.org/10.1186/s13023-021-02006-w.
3. **Kaiser, N., Gautschi, M., Bosanska, L., Meienberg, F., Baumgartner, M. R., Spinas, G. A., & Hochuli, M. (2019).** Glycemic control and complications in glycogen storage disease type I: results from the Swiss registry. *Molecular Genetics and Metabolism*, 126(4), 355-361.