Research Article

BIOMEDICAL Journal of Scientific & Technical Research

ISSN: 2574 -1241

DOI: 10.26717/BJSTR.2023.49.007820

A Retrospective Study of Insulin Resistance in Discharged and Deceased Patients

Mehmet Özdin[1] and Hayrullah Yazar[2]*

[1]*Sakarya University Training and Research Hospital, Biochemistry, Sakarya, Turkey*

[2]*Sakarya University Faculty of Medicine, Department of Biochemistry, Sakarya, Turkey*

***Corresponding author:** Sakarya University Faculty of Medicine, Medical Biochemistry Department, Turkey

ARTICLE INFO

Received: March 13, 2023

Published: April 04, 2023

Citation: Mehmet Özdin and Hayrullah Yazar. A Retrospective Study of Insulin Resistance in Discharged and Deceased Patients. Biomed J Sci & Tech Res 49(3)-2023. BJSTR. MS.ID.007820.

ABSTRACT

Introduction: In this study, the files of discharged and deceased patients were reviewed retrospectively, taking into account age and gender. Our aim; is to determine the insulin resistance of all patients by calculating the insulin and fasting blood glucose values and homa indexes in the blood serum.

Methods: Obtained the information of the patients included in the study through the Hospital Information Management System (HIMS). Considering the age and gender information of discharged and deceased patients, fasting blood glucose (mg/dL), evaluated insulin (μU/mL) and Homa-index data statistically. In the study, patients with a HOMA index of ≥2.7 were considered positive for insulin resistance (IR). Obtained approval of the study from the Sakarya University Ethics Committee (date and number: 03.05.2019, E.5229). All results were presented as mean ± standard error of the mean (SEM). Statistical comparisons were made using SPSS 19.0 statistical software (SPSS, Inc., Chicago, IL). For all statistical tests, $p<0.05$ was considered statistically significant.

Results: When comparing parameters according to death or discharge status, the glucose levels of the deceased were found to be significantly higher than those who were discharged. Detected no significant difference in insulin and homa index. There was a correlation between Homa index, insulin and glucose, as expected. While there was an important negative relationship between age and insulin (as one increases, the other decreases), there is a significant positive relationship between age and glucose (as one increases, the other increases). When evaluated only by gender, it found Homa-index and insulin were significantly higher in females than in males (discharged and deceased patients together). In those discharged, found insulin and Homa-index values of females were to be significantly higher than in males. However, found no significant difference in males and females in deceased patients.

Conclusion: Notably, in all patients who deceased and were discharged, the homa-index and insulin levels were significantly higher in females than in males. On the other hand, researching this fact with more comprehensive studies will positively contribute to clinicians in their approach to patients with suspected insulin resistance.

Keywords: Homa-Index; Glucose; Insulin; Age; Gender; Discharged Patient; Deceased Patients

Abbreviations: CVD: Cardiovascular Diseases; MetS: Metabolic Syndrome; IR: Insulin Resistance;

DM: Diabetes Mellitus; TyG: Triglyceride-Glucose Index; HIMS: Hospital Information Management System; HOMA-IR: Homeostatic Model Assessment Insulin Resistance; DiscP: Discharged Patients; DecP: Deceased Patients

Introduction

Considering that cardiovascular diseases (CVD) are prominent in morbidity and mortality worldwide, it is, of course, essential to investigate the role played by metabolic syndrome (MetS). Therefore, research on metabolic diseases has increased exponentially in the last decade. However, many aspects of this clinical indicator still need to be fully understood (Fahed G, et al. [1]). Insulin resistance (IR) is a significant clinical problem that needs to be addressed in this context. In addition, if specified, IR is an issue that needs to be addressed more seriously in women than in men. Because large-scale studies on women with a history of pregnancy with IR have shown that; recurrent pregnancy loss is highly associated with IR (Cai WY, et al. [2]). It is known that a group of risk factors, including IR and diabetes mellitus (DM), cause higher mortality rates. Metabolic disorders are among the main reasons for this, and lifestyle changes are considered in addition to existing treatment options (Gluvic Z, et al. [3]). In addition, studies investigating the effects of COVID-19 infection, especially in recent years, have shown that; IR increases the risk of death in patients with metabolic problems (Govender N, et al. [4]).

Although the relationship between IR and MetS is accepted, there are different approaches to this issue. For example, the triglyceride-glucose index (TyG) was shown to have higher predictive power than Homa-IR in a large-based, prospective cohort study with 12 years of follow-up on the close association of IR with MetS (Son DH, et al. [5]). In our study, besides Homa-IR, we analyzed glucose and insulin values in blood serum retrospectively. In our study, we retrospectively analyzed the glucose and insulin values in blood serum as well as Homa-IR. The information of the discharged and deceased patients were recorded using HIMS. Moreover, the age and gender information of the discharged and deceased patients were also recorded with HİIMS. Because as seen in hospital discharge and mortality studies, age, gender, and frequency of admission were taken into account (Heppleston E, et al. [6,7]). In this respect, our study is compatible with the literature.

Materials and Methods

Study Population

Approval of the study was obtained from the Sakarya University Ethics Committee (date and number: 03.05.2019, E.5229). The study received patient information retrospectively from HIMS, and deceased and discharged patients were evaluated separately.

Protocol Study Procedures

In the patient files, age, gender, and fasting determined blood glucose and serum insulin values. While receiving these data, The deceased and discharged patients were evaluated separately. Subsequently, the Homa-index values for IR were calculated as Fasting Glucose(mg/dL) fasting Insulin (μU/mL)/405. In the study, the IR of patients with a Homa-index value ≥2.7 was considered positive.

Biochemical and Hormonal Assays

Insulin (μU/mL) was measured by the chemiluminescent microparticle enzyme immunoassay (CMIA) method (ARCHITECT, Abbott Laboratories). The precision of the ARCHITECT Insulin study was determined to be ≤7% complete CV, with a sensitivity better than 1.0 μU/mL. Glucose (mg/dL) was determined quantitatively by enzymatic UV test using the hexokinase method (Beckman Coulter AU5800). The test linearity was in the concentration range of 10-800 mg/dL, while the lowest detectable level for its sensitivity was 0.04 mmol/L.

Statistical Analysis

All results were presented as mean±standard error of the mean (SEM). Statistical comparisons were made using SPSS 19.0 statistical software (SPSS, Inc., Chicago, IL). For all statistical tests, $p<0.05$ was considered statistically significant.

Results

According to the data obtained, Since the Homa index, insulin, and glucose are parallel parameters, correlations were seen between them. There was a significant negative relationship between age and insulin (as one increases, the other decreases) and a meaningful positive relationship between age and glucose value (as one increases, the other increases) (Table 1). In comparing parameters according to death or discharge, Glucose levels of those who died were found to be significantly higher than those those who were discharged. No significant difference was found in the insulin and the homa index (Table 2). When the deceased or discharged persons are evaluated according to their genders, the Homa index and insulin were found to be significantly higher in females than in males (Table 3). However, no significant difference was found between men and females in the parameters measured in the deceased (Table 4). On the other hand, Insulin and Homa index levels of discharged female were found to be significantly higher than men (Table 5).

Table 1: Correlation findings between Homa, insulin, glucose and age parameters Since insulin and glucose are parallel parameters, they are correlated.

Parameters		Homa	Insulin	Glucose	Age (Years)
Homa	r	1			
	p				
	n	2013			
Insulin	r	,946	1		
	p	,000			
	n	1962	1962		
Glucose	r	,609	,317	1	
	p	,000	,000		
	n	2010	1959	2010	
Age (Years)	r	-,036	-,113	,158	1
	p	,111	,000	,000	
	n	2013	1962	2010	2013

Table 2: The homa index, insulin and glucose values according to the condition of the patients.

Parameters	Patient Status	N	Mean	SD	SEM	P
HOMA	DecP	89	0,8232	0,5429	0,05755	0,372
	DiscP	1924	0,7729	0,51796	0,01181	
Insulin	DecP	89	1,2	0,47003	0,04982	0,362
	DiscP	1873	1,2433	0,43653	0,01009	
Glucose	DecP	89	2,2306	0,16646	0,01765	0,001
	DiscP	1921	2,1373	0,17719	0,00404	

Note: DiscP: discharged patients, DecP: deceased patients, SEM: standart error of the mean. SD: standard deviation. In comparing parameters according to death or discharge status, the glucose levels of the deceased were found to be significantly higher than those who were discharged ($p<0.05$).

Table 3: Comparison of parameters by gender.

Parameters	Gender	N	Mean	SD	SEM	P
HOMA	Male	1165	0,7457	0,50882	0,01491	0,003
	Female	848	0,8156	0,53042	0,01821	
Insulin	Male	1139	1,2153	0,43289	0,01283	0,002
	Female	823	1,2774	0,44288	0,01544	
Glucose	Male	1165	2,1387	0,17472	0,00512	0,421
	Female	845	2,1452	0,18184	0,00626	
Age (Years)	Male	1165	61,86	15,993	0,469	0,389
	Female	848	62,5	16,65	0,572	

Note: According to the genders, homa index and insulin were significantly higher in females than in men ($p<0.05$). SD: standard deviation, SEM: standart error of the mean.

Table 4: Comparison of findings according to gender parameter in deceased patients.

Parameters	Gender	N	Mean	SD	SEM	p
HOMA	Male	46	0,8519	0,55958	0,08251	0,608
	Female	43	0,7925	0,52933	0,08072	
Insulin	Male	46	1,2304	0,4979	0,07341	0,531
	Female	43	1,1675	0,44181	0,06738	
Glucose	Male	46	2,229	0,16299	0,02403	0,925
	Female	43	2,2324	0,17202	0,02623	
Age (Years)	Male	46	71,87	14,495	2,137	0,79
	Female	43	72,7	14,712	2,244	

Note: No significant difference was in the parameters measured in the deceased in males and females ($p>0.05$).

Table 5: Comparison of findings according to gender parameter in discharged patients.

Parameters	Gender	N	Mean	SD	SEM	p
HOMA	Male	1119	0,7413	0,50642	0,01514	0,002
	Female	805	0,8169	0,53078	0,01871	
Insulin	Male	1093	1,2147	0,43019	0,01301	0,001
	Female	780	1,2835	0,44243	0,01584	
Glucose	Male	1119	2,135	0,17426	0,00521	0,499
	Female	802	2,1405	0,18127	0,0064	
Age (Years)	Male	1119	61,45	15,923	0,476	0,501
	Female	805	61,96	16,579	0,584	

Note: Insulin and homa index values of discharged females were found to be significantly higher ($p<0.05$).

Discussion

Hyperglycemia emerging after IR emerges as an important public health problem because; The mean prevalence of MetS is shown as 31%. MetS, if additionally specified, coronary heart disease is associated with a two-fold increase in the risk of cerebrovascular disease and a 1.5-fold increase in the risk of death from all causes (Engin A [8]). Although MetS examination was not performed in our study, the detection of IR in deceased and discharged patients, taking into account gender and age, is an essential similarity with their research. The fact that the mortality rate was significantly higher in women in our study made us think that the incidence of IR and obesity may differ according to gender. In a study, it has been stated that the pathophysiology and management of obesity and visceral fat deposition in women are different from men (Kapoor E, et al. [9]). Again, regarding the IR treatment process, it is a health problem emphasized more carefully for all clinicians, especially women with a pregnancy history (Cai WY, et al. [2]). As a matter of fact, in our study, the fact that the IR was higher in women was found to be even more critical in this respect because other studies have emphasized the progression of insulin resistance during pregnancy in women (Tarasenko KV, et al. [10]). Studies have shown that obesity is an essential factor in the development of IR (Barazzoni R, et al. [11]). In addition, to mention; Obesity-related, therefore IR-related morbidity and other complications should be evaluated from this perspective.

Vascular surgery patients were examined in a study on the consequences of malnutrition on morbidity and mortality (Von Meijenfeldt GCI, et al. [12]). According to them, dietary guidance can benefit nutritional status and positively affect mortality. The relationship between IR, the subject of our study, and nutrition can be evaluated in this respect. In the study titled «transient blood lipid array and insulin resistance in perimenopausal women», whose mean age is consistent with our study, 1386 women (mean age 46.4 years) were examined (Yu W, et al. [13]). Their study also used Homa-Ir for insulin resistance. According to the results they obtained, they found a bidirectional relationship between lipids and insulin resistance. In our research, It is noteworthy that in all patients who died and were discharged, the homa and insulin levels were higher in women than in men. Homa-Index and blood inulin values were significantly higher in females than males. On the other hand, this may be related to the prevalence of obesity and lifestyle differences in women. In this respect, it is evident that the resulting result needs more extensive research.

Acknowledgment

Yıldırım KAYACAN. Yasar Dogu Faculty of Sports Sciences, Ondokuz Mayıs University, Samsun, Türkiye.

Financial Disclosure

No financial support was used for this study.

Conflict of Interest

All authors declare having no conflicts of interest.

References

1. Fahed G, Aoun L, Bou Zerdan M, Allam S, Bou Zerdan M, et al. (2022) Metabolic Syndrome: Updates on Pathophysiology and Management in 2021. Int J Mol Sci 23(2): 786.
2. Cai WY, Luo X, Lv HY, Fu KY, Xu J (2022) Insulin resistance in women with recurrent miscarriage: a systematic review and meta-analysis. BMC Pregnancy Childbirth 22(1): 916.
3. Gluvic Z, Zaric B, Resanovic I, Obradovic M, Mitrovic A, et al. (2017) Link between Metabolic Syndrome and Insulin Resistance. Curr Vasc Pharmacol 15(1): 30-39.
4. Govender N, Khaliq OP, Moodley J, Naicker T (2021) Insulin resistance in COVID-19 and diabetes. Prim Care Diabetes 15(4): 629-634.
5. Son DH, Lee HS, Lee YJ, Lee JH, Han JH (2022) Comparison of triglyceride-glucose index and HOMA-IR for predicting prevalence and incidence of metabolic syndrome. Nutr Metab Cardiovasc Dis 32(3): 596-604.
6. Heppleston E, Fry CH, Kelly K, Shepherd B, Wright R, et al. (2021) LACE index predicts age-specific unplanned readmissions and mortality after hospital discharge. Aging Clin Exp Res 33(4): 1041-1048.
7. Fluck D, Murray P, Robin J, Fry CH, Han TS (2021) Early emergency readmission frequency as an indicator of short-, medium- and long-term mortality post-discharge from hospital. Intern Emerg Med 16(6): 1497-1505.
8. Engin A (2017) The Definition and Prevalence of Obesity and Metabolic Syndrome. Adv Exp Med Biol 960: 1-17.
9. Kapoor E, Faubion SS, Kling JM (2019) Obesity Update in Women. J Womens Health (Larchmt) 28(12): 1601-1605.
10. Tarasenko KV, Gromova AM, Pikul KV, Lysenko RB, Nesterenko LA (2018) Pathogenesis of insulin resistance in pregnant women with obesity. Wiad Lek 71(4): 801-806.
11. Barazzoni R, Gortan Cappellari G, Ragni M, Nisoli E (2018) Insulin resistance in obesity: an overview of fundamental alterations. Eat Weight Disord 23(2): 149-157.
12. Von Meijenfeldt Gci, Mogensen KM, Van der Laan MJ, Zeebregts CJ, Christopher KB (2022) Nutritional status and out-of-hospital mortality in vascular surgery patients. PLoS One 17(7): e0270396.
13. Yu W, Zhou G, Fan B, Gao C, Li C, et al. (2022) Temporal sequence of blood lipids and insulin resistance in perimenopausal women: the study of women's health across the nation. BMJ Open Diabetes Res Care 10(2): e002653.

ISSN: 2574-1241

DOI: 10.26717/BJSTR.2023.49.007820

Sakarya University Faculty of Medicine. Biomed J Sci & Tech Res