Research Paper: The Prevalence of Diabetes Mellitus in Patients With Migraine: A Cross-Sectional Study in Iran

Amirreza Ghayeghran[1] , Seyede Tayebeh Hashemi[2*] , Alireza Razzaghi[3] , Saedeh Salehi[2]

1. Department of Neurology, Poursina Hospital, School of Medicine, Guilan University of Medical Sciences, Rasht, Iran
2. Neuroscience Research Center, Department of Neurology, Guilan University of Medical Sciences, Rasht, Iran
3. Safety Promotion and Injury Prevention Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

ABSTRACT

Background: Headache is one of the most common medical complaints occur in all ages. Migraine is the second leading cause of headache and is associated with many other disorders, such as obesity and metabolic syndromes.

Objectives: This study aimed to determine the prevalence of diabetes mellitus in patients with migraine referring to the Emam Reza Neurological Clinic (Poursina hospital, Guilan, Rasht) in 2016.

Materials & Methods: This descriptive cross-sectional study was performed on patients with migraine headache or history of migraine based on the International Headache Society (IHS) criteria referring to the Emam Reza Neurological Clinic (Poursina hospital) in the north of Iran (Guilan, Rasht) in 2016. The obtained data were entered in SPSS V. 22. The qualitative information were shown by average and standard deviation, also frequency and percentage were used to present nominal information.

Results: A total of 360 qualified patients were studied. Their Mean±SD age was 33.25±10.64 years. About 31.1% of participants were female. A total of 31 patients (9.4% of all under study population) had diabetes mellitus.

Conclusion: The prevalence of diabetes mellitus in patients with migraine was 9.4% which is close to what reported in normal population.

Keywords: Diabetes mellitus, Migraine headache, Prevalence

* Corresponding Author:
Seyede Tayebeh Hashemi, PhD
Address: Neuroscience Research Center, Department of Neurology, Guilan University of Medical Sciences, Rasht, Iran
Tel: +98 (911) 5718650
E-mail: tb.hashemi@yahoo.com

Highlights

● There is no significant difference between prevalence rates of diabetes mellitus (DM) in general population and DM patients with migraine.

Plain Language Summary

The determination of prevalence of diabetes mellitus in patients with migraine is one of important steps for finding the relationship between these two diseases. However, future cohort studies should be conducted to detect precise relationship between two diseases. The results of this study show that a large amount of patients with migraine are not diabetic and no significant difference between prevalence rates of diabetes mellitus in general population and DM patients with migraine.

Introduction

Headache is one of the most common medical complaints that occur in all age groups including children and elderly individuals. Almost all people have experienced headache at least once in their lives [1]. Migraine, a chronic neurovascular disease characterized by recurrent, debilitating headaches, is the second leading cause of chronic headache [2, 3]. Migraine is among 19 debilitating diseases in the world. Its prevalence has been reported 18% in women and 6% in men [4]. In Iran, the prevalence of migraine has been reported to be 14% according to the results of a meta-analysis study [1], which is higher than the global prevalence of 11.6% [5].

The pathogenesis of migraine is multi-factorial and genetics and the environment are effective in its development [6]. Migraine is associated with many peripheral and central disorders, such as ischemic stroke, Raynaud's phenomenon, epilepsy, depression, anxiety, obesity, and metabolic syndromes [6-8]. Recently, the relationship between migraine, metabolic syndrome, and insulin resistance has been investigated. The prevalence of migraine is estimated to be 11.9% in men and 22.5% in women with metabolic syndrome [6].

The patients with diabetes mellitus undergo some changes in vascular activity and nerve conduction, which can be similar to the pathophysiology of migraine [9]. The main mechanism of these disorders (diabetes and migraine) and their complex interactions remains unknown. Recently, insulin resistance has been shown in non-obese migraine patients in some case studies [10]. Some studies have reported that although migraine is not more common in obese patients, obesity is a risk factor for chronic migraine [11]. The study of the relationship between migraine and diabetes will help to find clues

about the pathophysiology of this disorder and preparing new therapeutic strategies for them [3, 12]. This study aimed to determine the prevalence of diabetes mellitus in patients with migraine.

Materials and Methods

A descriptive cross-sectional study was performed on 360 patients with migraine headache complaints or its history referring to a neurology clinic of an academic hospital (Poursina hospital, Emam Reza Clinic) in the north of Iran (Guilan, Rasht) in 2016. The study inclusion criteria were complaining of migraine headache or its history being diagnosed based on the International Headache Society (IHS) criteria. Exclusion criteria included leaving the next visits to receive the laboratory tests' results.

The demographic characteristics of patients including age, sex, and degree of education were recorded. Then, migraine diagnosis and headache characteristics (site, quality, duration of headache, accompanying aura), symptoms associated with headache (photophobia, phonophobia, osmophobia, blurred vision, presence of light sparks during pain), migraine history in the patient and his/her family and medication use to control migraine were taken and recorded. Next, the patients were divided into four groups; the patients with no history of migraine, active migraine with aura, active migraine without aura, and with a history of migraine but no migraine headache during the last year.

Diabetic patients were investigated for their diabetes history, family history of diabetes, and medication used for controlling diabetes. Blood sugar was measured in patients who did not have any fasting blood sugar, random blood sugar, and HbA1C during the last year. If the fasting blood glucose was less than 126 mg/dL, random blood

Ghayeghran A, et al. Diabetes Mellitus in Migraine. Caspian J Neurol Sci. 2018; 4(3):128-134.

129

glucose less than 200 mg/dL, and HbA1C less than 6.5%, the patient was considered as non-diabetic. If the test was abnormal (blood glucose more than 126 mg/dL), the above-mentioned test was repeated at least 24 hours later. If the test results was still high, the diabetic patient was considered newly diagnosed, and if the second test was normal, the patient was considered a non-diabetic patient.

Patients, who have done blood glucose test during the past year with normal results, were considered non-diabetic patients. However, if blood sugar tests were abnormal, the tests were repeated. If confirmed, the patient was considered newly diagnosed diabetic patient. If the second test was normal, the patient was considered non-diabetic. The data were entered in SPSS version 22 to qualitatively analyze qualitative information (age, sex, job, education, known case and new case of diabetes) by calculating mean and standard deviation for quantitative information and frequency and percentage for nominal information. This research aimed to determine the prevalence of diabetes mellitus in understudy population (migraine patients).

Results

This study was performed on 360 patients with migraine headache referring to the neurological clinic. The Mean±SD age of subjects was 33.25±10.64 years. About 46.1% of migraine patients were less than or equal to 30 years old, and 53.9% of them were over 30 years of age. About 3% of diabetic patients were less than or equal to 30 years old, and 13.4% were over 30 years old.

Around 68.9% of the participants were women. Most of the female participants in the study were housewives (36.9%). The level of education of most participants was under diploma (48.1%). The history of diabetes was observed in 8.3% and the history of migraine in 64.2% (35.5% of patients were new case of diagnosed migraine) of patients. About 56.4% of our patients (migraine patients) had a history of diabetes in their family and 70.6% had the family history of migraine.

The results showed that 30 patients (8.3%) had diabetes history (previously diagnosed DM). Only one of the study participants had newly diagnosed Diabetes Mellitus (DM). A total of 31 migraine patients (9.4% of total our understudy patients) suffered from diabetes. Table 1 shows the distribution of the variables in 31 migraine patients having diabetes. The results showed that the number of diabetic women was higher than that of diabetic men, and this difference was not significant. The number of the married group was more than the single one. This difference was statistically significant (P=0.04).

Table 1. Distribution of the studied variables in 31 migraine patients with diabetes mellitus

Variable		No. (%)
Family history of diabetes mellitus		25(80.6)
Family history of migraine		14(65.5)
Diabetes history		30(96.7)
History of Migraine		25(80.6)
Taking migraine medication		21(67.7)
Location of headache	Unilateral	29(93.5)
	Bilateral	1(3.2)
	Unilateral and broadcast	1(3.2)
Headache type	Throbbing	31(100)
	Tension	0(0)
	Stinging	0(0)
	Ambiguous	0(0)
Aura		2(6.5)

Ghayeghran A, et al. Diabetes Mellitus in Migraine. Caspian J Neurol Sci. 2018; 4(3):128-134.

CJNS

Discussion

The results of this study showed that 56.4% of our migraine patients had a family history of diabetes and 9.4% of them suffered from diabetes. The studies conducted in Iran report that the prevalence of diabetes is increasing in the country [13]. The results of a prospective study that evaluated the risk factors of non-communicable diseases in a population in Tehran in 1999 report that the prevalence of glucose metabolism disorders has increased in the population. The prevalence of diabetes in this study was higher in women [14].

The number of diabetic patients was estimated as 3.6 million in 2008 according to the epidemiological studies conducted in Iran [15]. The prevalence of diabetes mellitus in the Guilan Province general population was reported as 9.69% in 2009 [16]. The comorbidity of diabetes and migraine has been pointed out in numerous studies. This comorbidity has been reported to be less than that in the general population in some studies [17] and more than that in the general population in some other studies [18]. A cohort study conducted in 15 years report that the risk ratio of diabetes for women suffering from migraine with aura was 1.06 and for women having migraine without aura was 1.01 [19].

In a study in 2013, Berge and his colleagues investigated the protective effect of diabetes on migraine, and found that the patients who received diabetic medication had lower prevalence of migraine compared to the non-diabetic population. Also, in people under oral diabetes treatment (in all types of diabetes), the prevalence of migraine decreases with age which is similar to the prevalence in non-diabetic patients aged 60-69 years. These findings indicate that the prevalence of migraine in older patients with diabetes treated with oral medication for controlling diabetes is significantly lower than that in the general population [20].

In this study, most participants had under diploma degree. In a population-based study conducted in Iran in Khorasan Province in 2010, the maximum prevalence of diabetes was seen in the uneducated people [13].

A study on patients with a history of diabetes mellitus reported that 56.4% of the subjects had a family history of diabetes. Genetic and environmental factors are involved in the aetiology of type 2 diabetes. Genetic factors in type 2 diabetes tend to be stronger than type 1, and therefore, disease clustering can be observed in families in type 2 diabetes [21]. Epidemiological studies in Iran indicate that the prevalence of migraine is diverse in different cities of Iran. In a study conducted in Rasht City in 2002, the prevalence was reported to be 8.85% [22]. The number of people with a family history of diabetes and migraine is more than that of other people, and this difference is statistically significant. On the other hand, the results indicate that the highest percentage of migraine patients do not suffer from diabetes.

There is no study on family history of diabetes and migraine and their relationship; however, Guldiken et al. examined the one-year prevalence of migraine in patients with metabolic syndrome in 2009. They reported that migraine prevalence is more frequent in the patients with metabolic syndrome. The migraine patients with metabolic syndrome developed diabetes, are significantly more common than patients without migraine. The results of this study also suggest that the prevalence of migraine in patients with metabolic syndrome is higher than that in the general population [7].

Burch and his colleagues also studied the relationship between migraine and the incidence of diabetes in adult women. They found no relationship between migraine and diabetes [19]. Studies have shown that patients with diabetes mellitus undergo changes similar to migraine path physiology in vascular function and nerve conduction [9, 23]. Some evidence indicates a relationship between migraine and endothelial dysfunction, which can mostly predict the relationship of this disease with cardiovascular diseases and diabetes [24, 25]. Because of its cross-sectional nature, our study is unable to determine the study relationship with certainty, as well as its chronological order, so it calls more extensive studies in this regard.

Conclusion

Our study findings indicate that most people with migraine do not suffer from diabetes. Various studies have shown different results. To investigate the relationship between migraine and diabetes, more studies are required. These studies should determine the necessity of screening tools in the general population for diabetic patients with migraine and its associated prophylactic measures for patients at lower ages.

Ethical Considerations

Compliance with ethical guidelines

The patients were assured of the confidentiality of their information and the study process was explained

Ghayeghran A, et al. Diabetes Mellitus in Migraine. Caspian J Neurol Sci. 2018; 4(3):128-134.

131

to them. Also, the informed consent was obtained from them (Ethics code: IR-GUMS.REC.1395.114).

Funding

Conflict of interest

The authors have no conflict of interest.

Acknowledgements

References

[1] Farhadi Z, Alidoost S, Behzadifar M, Mohammadibakhsh R, Khodadadi N, Sepehrian R, al. The prevalence of migraine in Iran: A systematic review and meta-analysis. Iran Red Crescent Med J. 2016; 18(10):e40061. [DOI:10.5812/ircmj.40061]

[2] Miri A, Nasiri M, Zonoori S, Yarahmad F, Dabbagh-Moghadam A, Askari G, et al. The association between obesity and migraine in a population of Iranian adults: A case-control study. Diabetes Metab Syndr: Clin Res Rev. 2018; 12(5):733-6. [DOI:10.1016/j.dsx.2018.04.020]

[3] Rainero I, Govone F, Gai A, Vacca A, Rubino E. Is migraine primarily a metaboloendocrine disorder. Curr Pain Headache Rep. 2018; 22(5):36. [DOI:10.1007/s11916-018-0691-7]

[4] Hossain MA, Hakim M, Hasan M, Rahman MA, Rashid M, Sagir G, et al. Socio-demographic and comorbidity profiles of migraine patients in a headache clinic of a tertiary care hospital in Dhaka City. J Natl Inst Neurosci Bangladesh. 2017; 3(1):48-51. [DOI:10.3329/jninb.v3i1.36272]

[5] Woldeamanuel Y, Cowan R. Worldwide migraine epidemiology: Systematic review and meta-analysis of 302 community-based studies involving 6,216,995 participants. Neurol. 2016; 86(Suppl 16):P6-100. [DOI:10.1016/j.jns.2016.11.071]

[6] Bhoi SK, Kalita J, Misra UK. Metabolic syndrome and insulin resistance in migraine. J Headache Pain. 2012; 13(4):321-6. [DOI:10.1007/s10194-012-0416-y]

[7] Guldiken B, Guldiken S, Taskiran B, Koc G, Turgut N, Kabayel L, et al. Migraine in metabolic syndrome. Neurologist. 2009; 15(2):55-8. [DOI:10.1097/NRL.0b013e31817781b6]

[8] Buse DC, Manack A, Serrano D, Turkel C, Lipton RB. Sociodemographic and comorbidity profiles of chronic migraine and episodic migraine sufferers. J Neurol, Neurosurg Psychiatry. 2010; 81(4):428-32. [DOI:10.1136/jnnp.2009.192492]

[9] Scher AI, Terwindt GM, Picavet HS, Verschuren WM, Ferrari MD, Launer LJ. Cardiovascular risk factors and migraine The GEM population-based study. Neurol. 2005; 64(4):614-20. [DOI:10.1212/01.WNL.0000151857.43225.49]

[10] Rainero I, Limone P, Ferrero M, Valfrè W, Pelissetto C, Rubino E, et al. Insulin sensitivity is impaired in patients with migraine. Cephalalgia. 2005; 25(8):593-7. [DOI:10.1111/j.1468-2982.2005.00928.x]

[11] Bigal ME, Liberman JN, Lipton RB. Obesity and migraine a population study. Neurol. 2006; 66(4):545-50. [DOI:10.1212/01.wnl.0000197218.05284.82]

[12] Aamodt AH, Stovner LJ, Midthjell K, Hagen K, Zwart JA. Headache prevalence related to diabetes mellitus: The Head-HUNT study. Eur J Neurol. 2007; 14(7):738-44. [DOI:10.1111/j.1468-1331.2007.01765.x]

[13] Azimi-Nezhad M, Ghayour-Mobarhan M, Parizadeh MR, Safarian M, Esmaeili H, Parizadeh SM, et al. Prevalence of type 2 diabetes mellitus in Iran and its relationship with gender, urbanisation, education, marital status and occupation. Singapore Med J. 2008; 49(7):571-6. [PMID]

[14] Azizi F, Rahmani M, Emami H, Mirmiran PA, Hajipour R, Madjid M, et al. Cardiovascular risk factors in an Iranian urban population: Tehran lipid and glucose study (phase 1). Soz Praventivmed. 2002; 47(6):408-26. [PMID]

[15] Gu D, Reynolds K, Duan X, Xin X, Chen J, Wu X, et al. Prevalence of diabetes and impaired fasting glucose in the Chinese adult population: International Collaborative Study of Cardiovascular Disease in Asia (InterASIA). Diabetol. 2003; 46(9):1190-8. [DOI:10.1007/s00125-003-1167-8] [PMID]

[16] Haghdoost AA, Rezazadeh Kermani M, Sadghirad B, Baradaran HR. Prevalence of type 2 diabetes in the Islamic Republic of Iran: Systematic review and meta-analysis. East Mediterr Health J. 2009; 15(3):591-9. [PMID]

[17] Kurth T, Gaziano JM, Cook NR, Logroscino G, Diener HC, Buring JE. Migraine and risk of cardiovascular disease in women. JAMA. 2006; 296(3):283-91. [DOI:10.1001/jama.296.3.283]

[18] Sillanpää M, Aro H. Headache in teenagers: Comorbidity and prognosis. Funct Neurol. 2000; 15(Suppl 3):116-21. [PMID]

[19] Burch RC, Rist PM, Winter AC, Buring JE, Pradhan AD, Loder EW, et al. Migraine and risk of incident diabetes in women: A prospective study. Cephalalgia. 2012; 32(13):991-7. [DOI:10.1177/0333102412453954] [PMID]

[20] Berge LI, Riise T, Fasmer OB, Hundal Ø, Oedegaard KJ, Midthjell K, et al. Does diabetes have a protective effect on migraine. Epidemiol. 2013; 24(1):129-34. [DOI:10.1097/EDE.0b013e31827623d0]

[21] Melmed S. Williams textbook of endocrinology. Amsterdam: Elsevier Health Sciences; 2016.

[22] Ghayeghran AR, Dehnadi Moghadam A, Sedighi Moghadam P. [Survey of Teachers' Knowledge about Migraine in Rasht in 2005 (Persian)]. J Guilan Univ Med Sci. 2007; 16(61):51-9.

[23] Stang PE, Carson AP, Rose KM, Mo J, Ephross SA, Shahar E, et al. Headache, cerebrovascular symptoms, and stroke The Ather-

osclerosis Risk in Communities Study. Neurol. 2005; 64(9):1573-7. [DOI:10.1212/01.WNL.0000158326.31368.0] [PMID]

[24] Liew G, Wang JJ, Mitchell P. Migraine and coronary heart disease mortality: A prospective cohort study. Cephalalgia. 2007; 27(4):368-71. [DOI:10.1111/j.1468-2982.2007.01298.x] [PMID]

[25] Rosamond W. Are migraine and coronary heart disease associated? An epidemiologic review. Headache: J Head Face Pain. 2004; 44:S5-12. [DOI:10.1111/j.1526-4610.2004.04103.x]

Ghayeghran A, et al. Diabetes Mellitus in Migraine. Caspian J Neurol Sci. 2018; 4(3):128-134.

133