

In the name of God

Shiraz E-Medical Journal
Vol. 13, No. 3, July 2012

<http://semj.sums.ac.ir/vol13/jul2012/90039.htm>

Comparison of Prevalence of Fatigue in Adult Diabetic Mellitus Patients with Healthy Population in Shiraz 2010

Negin Hadi ^{1*}, Zeinab Khademalhosseini ², Mitra Khademalhosseini ³,

¹ Community Medicine, Shiraz University of medical sciences, member of Neurosciences research center, member of Research center for psychiatry and behavioral sciences, Shiraz University of Medical Sciences, Shiraz, Iran

² Shiraz University of Medical Sciences, Shiraz, Iran

³ Family Medicine position, Shiraz, Iran

Corresponding author: Negin Hadi, Department of Community Medicine, Shiraz Medical School, Zand Avenue, Shiraz, Iran, Telephone: +98-7112354431, Email: hadin@sums.ac.ir

Received for Publication: December 30, 2011, Accepted for Publication: June 15, 2012

Abstract

Background: Diabetes mellitus refers to a group of common metabolic disorders that share phenotype of hyperglycemia. Fatigue is one of complains of diabetic patients. Due to lack of available documents in the prevalence of fatigue in Iran, we decided to study prevalence of this problem in our diabetic patients and compare with normal population.

Material and Methods: This is a cross-sectional study that was done in Shiraz city (in south of Iran). Sample included 400 patients diagnosed with diabetes referred to Naderkazemi diabetes health center and 400 healthy controls among patient's attendance and health center staff, were matched in age and gender with patient group. Data was collected by using Iowa Fatigue Scale (IFS) questionnaire. This questionnaire consisted of 2 parts. Second part included 11 questions that evaluated level of fatigue. Its validity and reliability was confirmed. Data was analyzed by SPSS 15 by chi-square test and $p < 0.05$ was considered as significant level.

Results: 223 (55.75%) patients reported fatigue and 96 (24%) had sever fatigue. Also in control group 94 (23.5%) persons had fatigue and 23 (5.75%) had sever fatigue and difference between two groups was statistically significant. Some demographic factors

such as age, duration of disease and education had a significant linear relationship with fatigue.

Conclusion: Considering the severity of fatigue among diabetic patients and its relation with older age, higher educational level and duration of disease further recommended interventions specially in this group of patients with serious matters such as the use of better therapies, social work and rehabilitation, providing more facilities for assistance and treatment, mental health and ... comes to action.

Keywords: Fatigue; Diabetes; Prevalence; Shiraz city

1. Introduction

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia. The metabolic dysregulation associated with DM causes secondary pathophysiologic changes in multiple organ systems that impose a tremendous burden on the individual with diabetes and on the health care system. With an increasing incidence worldwide, DM will be a leading cause of morbidity and mortality for the foreseeable future.(1) Two main classifications of diabetes mellitus exist, idiopathic and secondary. Idiopathic diabetes is divided into two main types; insulin dependent diabetes mellitus, IDDM (Type 1) and Non-insulin-dependent diabetes mellitus, NIDDM (Type 2).(2)

Prevalence of type 2 DM is raising much more rapidly because of increasing obesity and reduced activity levels as countries become more industrialized.(1) Diabetes affects more than 190 million individuals in the world. It is forecasted that more than 330 million individuals suffer from DM in 2025.(3) In Iran, in 2006 more than four million individuals suffered from diabetes and every 15 years this statics become twice. Diabetes is 9th reason of mortality in Iran.(4) Prevalence of type 2 diabetes in Iran is 24% in population with more than 40 years old.(5)

Diabetes has both acute and chronic complications. Acute complications are hypoglycemia, Diabetes Keto Acidosis (DKA) and hyperglycemic hyperosmo-

lar state (HHS).(6) Chronic complications contain nephropathy, retinopathy, neuropathy, coronary artery disease, hypertension, peripheral neuropathy and cerebro vascular disease.(6)

One of the diabetes symptom that we can considered as complication is fatigue. The people with diabetes report it twice as often as non diabetics.(7) Fatigue (also called exhaustion and lethargy) is a state of awareness describing a range of afflictions, usually associated with physical and/or mental weakness, though varying from a general state of lethargy to a specific work-induced burning sensation within one's muscles. Physical fatigue is the inability to continue functioning at the level of one's normal abilities.(8-10) It is widespread in everyday life, but usually becomes particularly noticeable during heavy exercise. Mental fatigue, on the other hand, rather manifests in somnolence (sleepiness).

Statics about prevalence of fatigue are different from 7 % to 45%.(7)

In diabetic patients, there is fatigue due to some physiologic process. It can be a symptom of hyperglycemia or hypoglycemia. Also fatigue can be one of the problem of chronic complications and long course of treatment.(7) Peripheral neuropathy influences hands and feet more. Foot pain has a direct relation with general weakness, physical fatigue and decreasing in activity.(11) Most type 2 diabetic patients have overweight (12) and it is in relation with more fatigue.(13) Diabetic patients suffer from depression

and fatigue is in relation with depression.(14) Medicines are used in diabetes treatment have many side effects. Metformin is an oral diabetes drug that is commonly prescribed early in the course of diabetes. Weakness and myalgia was reported as its side effects. Sulfonylureas such as glyburide have side effects like arthralgia and myalgia also fatigue and muscle weakness are two side effects of insulin.(15) So these side effects can cause fatigue too.

Diabetes affects all aspects of diabetic patient's lives: physical, psychological, social, and emotional (16) and it can cause inability to work and it is due to symptoms like fatigue. There is no cure for diabetes. Treatment includes medicines, diet, and exercise to control blood sugar and prevent symptoms.

Considering the high prevalence and incidence of diabetes in Iran and in the world and fatigue caused by this disease and its treatment, and due to lack of available documents in the prevalence of fatigue in Iran, we decided to study prevalence of this problem according to demographic factors in our diabetic patients and compare with normal population.

2. Material and Methods

This is a cross sectional study that was conducted in Shiraz city (south of Iran) and prevalence of fatigue in adult diabetic patients was compared with healthy population.

Sample included 400 patients diagnosed with diabetes referred to Naderkazemi diabetes health center that is subordinate of Shiraz University of Medical Sciences and 400 healthy controls among patient's attendance and health center staff who were matched by age and gender with the patient group.

Inclusion criteria were: all diabetic patients who were diagnosed by specialist and were above 18 years old and referred to Naderkazemi diabetes health center and agreed to cooperate

in study. The patients who didn't agree to attend in the study were excluded.

Data was collected by using Iowa Fatigue Scale (IFS) questionnaire.(17) The questionnaire was translated in Persian under supervision of one of the Shiraz university of Medical Sciences English language professor (forward and backward method) and we used its Persian version. Also questionnaire's validity was confirmed by two specialists (Endocrinologist and social medicine specialist). We used Cronbach alpha test for reliability ($r = .84$). This questionnaire consisted of 2 parts: first part included demographic information (age, sex, education, duration of disease, job and type of diabetes) and second part included 11 questions that evaluated level of fatigue. (4 questions were in cognitive aspects, 2 questions were about physical fatigue, 3 questions about energy rate and 2 questions about work output). We considered 5 age groups: 18-28 years, 29-38 years, 39-48 years, 49-58 years and above 58 years. For education we considered 3 groups: under diploma, diploma and Higher diploma (collegiate). Also considered 4 groups for job include unemployed, workman, employee and other jobs. Because workman people were few (2 persons) we merged this group with employee group. We considered housewife women and retired people as unemployed. Fatigue score range was from 11 to 55.11 score indicated the minimum fatigue rate and 55 was maximum rate. We considered score up from 30 as existence of fatigue. We divided severity of fatigue in two groups: score from 30 till 39 as fatigue and score from 40 till 55 as severe fatigue.

Data were analyzed by SPSS 15 by chi-square test and $P < 0.05$ was considered as significant level.

3. Results

In this study 115 (28.75 %) of cases and controls was male and 285 (71.25 %) was female. Mean age of cases was

51.39 ± 12.8. Minimum age was 18 year old and maximum was 83. Frequency and percent of cases and controls at age groups, sex, educational levels, job groups, type of disease, and duration of the disease are shown in Table 1. Most cases and controls were in age group of 49-58 year old. In educational levels it shows most percent of cases and controls were in under diploma group. Most cases and controls were in unemployed group. Mean Duration of the disease was 11.81 ± 7.23 (minimum 1 year and maximum 35 years).

In this study 319 (79.8 %) cases had fatigue and sever fatigue. 223 cases had fatigue and 96 had sever fatigue. As Table 2 shows between age and fatigue and sever fatigue was an meaningful relation ($P = 0$). The rate of sever fatigue significantly increases with rising of age.

There was a statistical meaningful relation between Educational level and fatigue and sever fatigue ($P = 0.015$). Table 2 shows fatigue and sever fatigue increase with increasing in educational level. There was not any meaningful relation between gender and prevalence of fatigue or sever fatigue. ($P = 0.475$)

We didn't find any statistical meaningful relation between job and prevalence of fatigue and sever fatigue with using chi-square test ($P = 0.092$). Also there was not any statistical meaningful relation between type of disease and prevalence of fatigue and sever fatigue ($P = 0.216$).

Table 3 shows that there was a statistical meaningful relation between duration of disease and prevalence of fatigue and sever fatigue ($P = 0.0$) and prevalence of sever fatigue increase with increasing duration of disease.

Tables 2 shows comparison between prevalence of fatigue and sever fatigue in both case and control groups.

Comparison between prevalence of fatigue and sever fatigue in both case

and control groups according to age groups, gender, job groups and educational levels are shown in Table 2.

4. Discussion

Excessive fatigue has always an underlying physical or psychological cause. Diabetes obviously can be one of the causes of fatigue. Fatigue prevents patients to enjoying their life and as a result causes lower quality of life. The patients with fatigue are unable to carry out their responsibilities.

In this study we compared prevalence of fatigue in diabetic patients with healthy population. We found that 79.75% of patients and 29.9 % of control group had fatigue. In one study had been showed that prevalence of fatigue differs in healthy population from 7 % to 45 %.(7) According to this data, prevalence of fatigue is high in our healthy population and maybe the reason is high prevalence of depression among our population. Neuropsychiatric disorders are second reason of burden of disease in Iran.(18) We should keep this in our mind and do more researches for finding its causes.

Drivsholm et al in 2005 showed there was fatigue in 61% of diabetic patients in the time of diagnosing their disease.(19) But we didn't find any study that had been compared prevalence of fatigue in diabetic patient and healthy population.

Diabetic patients face with many problems including changing of diet, permanent dependency to medications, short or long time complications and also the costs of these. It seems that these problems cause physical and psychological fatigue.

In this study, most of patients were female. It seems that men referred to this center less than female because of not having enough time and also most of females were housewife and because we considered them as unemployed people and this justifies why in this study most people were in unemployed group.

Results showed that most patients were in under diploma educational group and maybe the reason is that patients with low educational level referred to private centers less than patients with high educational level and Naderkazemi diabetes health center is subordinate of Shiraz University of Medical Sciences and most low economical people refer there and obviously most of them are unemployed and it is located in a poor region of south of Shiraz city.

Diabetes is one of the metabolic disorders in old age people and in this study most patients were in range of 49-58 years old.

As we expecting, most patients had type 2 diabetes mellitus.

We found that there was a meaningful relation between severity of fatigue and age and fatigue increases with increasing age. Monjamed and her colleagues in a study about quality of life of diabetic patients concluded that older people had lower score in quality of life.(20) It seems that physical problems and diabetes complications are more in old age and they can't work so they become effete and fatigue. Also most cases in this study were female and because of menopausal complications in older age and high prevalence of depression that is first reason of burden of disease in this sex, severity of fatigue was higher in this group.

Also we found that severity of fatigue increases with duration of disease. In one study in Semnan (a city in middle part of Iran) there was a meaningful relation between severity of depression and duration of diabetes, as 33% of patients who suffered from diabetes for more than 16 years, had severe depression.(21) Neuropsychiatric disorders are second reason of burden of disease in Iran (18) and according to a study, depression is an important psychiatric complication of diabetics and is more frequent among females in Iran.(22)

It seems that increasing the duration of the disease causes some complications like hopefulness and depression, that all of these cause physical and psychological fatigue.

Results showed that severity of fatigue increases with high educational levels. We can justify that because patients with high educational levels have jobs that are with more stress and responsibility and this causes fatigue.

In this study there wasn't any relation between gender and prevalence of fatigue. Also Warren et al showed that there wasn't any relation between gender and diabetes symptoms (like Fatigue).(23)

We didn't find any relation between job and type of diabetes with prevalence of fatigue.

5. Conclusion

Considering the severity of fatigue among diabetic patients with older age, higher educational level and duration of disease further recommended interventions specially in this group of patients with serious matters such as the use of better therapies, social work and rehabilitation, providing more facilities for assistance and treatment, mental health and ... comes to action.

5.1 Study Limitations and Offers

Our study limitations were: this study was done among low economical individuals of our society, and we didn't consider Blood sugar of the patients and its relation with fatigue. We offer more researches in future that consider patient's blood sugar and use more sample size. Also samples of future studies could include patients who refer to both private and non private health centers. Although we didn't consider relation of diabetes complications with fatigue such as renal, ophthalmic and neurologic complications, we offer more study in this area. As we found that with rising age, fatigue becomes more, so we should keep this in our mind for establishing centers that

support old age diabetic patients and be specific for them.

Acknowledgment

The authors would like to thank the vice chancellor of research of Shiraz University of Medical Sciences and also Dr Asieh Khoshandish, because

this study used her thesis for the degree of doctor of medicine.

Competing interests

None.

Ethics approval

Ethics approval was obtained.

TABLE 1. Frequency and Percent of Cases and Controls at Age Groups, Sex, Educational Levels, Job Groups, Type of Disease and Duration of the Disease

Group	Number(Percent) of cases	Number(Percent) of controls
Age		
18-28 year old	34 (8.5%)	34 (8.5%)
29-38 year old	22 (5.5%)	22 (5.5%)
39-48 year old	86 (21.5%)	86 (21.5%)
49-58 year old	141 (35.3%)	141 (35.3%)
Above 58 year old	117 (29.2%)	117 (29.2%)
Sex		
Male	115 (28.75%)	115 (28.75%)
Female	285 (71.25%)	285 (71.25%)
Education		
Under diploma	271 (68%)	240 (60%)
Diploma	84 (21%)	32 (8%)
Higher Diploma (collegiate)	45 (11%)	128 (32%)
Job		
Unemployed	333 (83.25%)	222 (55.5%)
Employee	39 (9.75%)	66 (16.5%)
Other jobs	28 (7%)	112 (28%)
Type of disease		
Type 1	66 (16.5%)	-
Type 2	334 (83.5%)	-
Duration of the disease		
Under 5 years	96 (24%)	-
6-9 years	64 (16%)	-
10-14 years	105 (26.3%)	-
15-19 years	73 (18.2%)	-
Upper than 20 years	62 (15.5%)	-
Total	400 (100%)	400 (100%)

TABLE 2. Comparison between Prevalence of Fatigue and Sever Fatigue in Both Case and Control Groups at Age, Gender, Job Groups and Educational Levels

group	Case group			Control group			P-value
	Fatigue	Sever	Fa-	Fatigue	Sever	Fa-	

	Number (%)	tigue Number (%)	Number (%)	tigue Number (%)	e
Age 18- 28 years	3 (100%)	0 (0%)	5 (62.5%)	3 (37.5%)	0.4
29-38 years	2 (100%)	0 (0%)	7 (100%)	0 (0%)	–
39-48 years	62 (96.9%)	2 (3.1%)	17 (65.4%)	9 (34.6%)	0.0
49-58 years	116 (86.6%)	18 (13.4%)	33 (76.7%)	10 (23.3%)	0.1
Upper than 58 years	40 (34.5%)	76 (65.5%)	32 (97%)	1 (3%)	0.0
Gender Male	65 (69.1%)	29 (30.9%)	31 (83.8%)	6 (16.2%)	0.12
Female	158 (70.2%)	67 (29.8%)	63 (78.8%)	17 (21.3%)	0.14
Job Unemployed	187 (67.8%)	89 (32.2%)	73 (81.1%)	17 (18.9%)	0.01
Employee	21 (80.8%)	5 (19.2%)	11 (91.7%)	1 (8.3%)	0.36
Other jobs	15 (88.2%)	2 (11.8%)	10 (66.7%)	5 (33.3%)	0.14
Educational level Under diploma	166 (71.9%)	65 (28.1%)	29 (80.6%)	7 (19.4%)	0.31
Diploma	42 (70%)	18 (30%)	33 (82.5%)	7 (17.5%)	0.23
Higher diploma(collegiate)	15 (53.6%)	13 (46.4%)	32 (78%)	9 (22%)	8
Total	223 (55.75%)	96 (24%)	94 (23.5%)	23 (5.75%)	0.03

TABLE 3. Prevalence of Fatigue and Sever Fatigue in Adult Diabetic Patients Referred to Naderkazemi Diabetes Health Center According to the Duration of Disease

Duration of disease	Fatigue Number (%)	Sever fatigue Number (%)	Total
Under 5 years	35 (94.6%)	2 (5.4%)	37 (100%)
6-9 years	44 (91.7%)	4 (8.3%)	48 (100%)
10-14 years	87 (86.1%)	14 (13.9%)	101 (100%)
15-19 years	43 (60.6%)	28 (39.4%)	71 (100%)
Upper than 20 years	14 (22.6%)	48 (77.4%)	62 (100%)

References

1. Wiener C. Harrison's Principles of Internal Medicine: McGraw-Hill; 2008.
2. Raj vv, srikanth l, venkateshwarlu l. In vivo animal models for screening of antidiabetic activity. International journal of pharma and bio sciences. 2010;1(4):669-85.
3. Azimi-Nezhad M, Ghayour-Mobarhan M, Parizadeh M, Safarian M, Esmaili H, Parizadeh S, et al. Prevalence of type 2 diabetes mellitus in Iran and its relationship with gender, urbanisation, education, marital status and occupation.

- Singapore medical journal. 2010;49(7):571.
4. Haririan H, Moghadasian S, Aghajanlo A. Quality of life and its aspects in diabetic patients referred to diabetic center of Tabriz University of medical sciences, 2007. . Iran Diabetes and Lipid J. 2009;2:152_60.
 5. Haghdoost A, Rezazadeh-Kermani M, Sadghirad B, Baradaran H. 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.
 6. Barnett P, Braunstein G. Diabetes mellitus. In: Carpenter Charls CJ, Griggs RC, Benjamin IJ, Editors. Cecil essential of medicine, 7th ed, . New York: Saunders. 2007: 621_39.
 7. Weijman I, Ros WJG, Rutten Gehm, Schaufeli WB, Schabracq MJ, Winnubst JAM. Fatigue in employees with diabetes: its relation with work characteristics and diabetes related burden. Occupational and environmental medicine. 2003;60(suppl 1):i93-i8.
 8. Gandevia S. Some central and peripheral factors affecting human motoneuronal output in neuromuscular fatigue. Sports medicine (Auckland, NZ). 1992;13(2):93.
 9. Hagberg M. Muscular endurance and surface electromyogram in isometric and dynamic exercise. Journal of Applied Physiology. 1981;51(1):1-7.
 10. Hawley J, Reilly T. Fatigue revisited. Journal of sports sciences. 1997;15(3):245.
 11. Rijken P, Dekker J, Dekker E, Lankhorst G, Bakker K, Dooren J, et al. Clinical and functional correlates of foot pain in diabetic patients. Disability & Rehabilitation. 1998;20(9):330-6.
 12. Association AD. Diagnosis and classification of diabetes mellitus Diabetes Care. 2008;31:55-60.
 13. Resnick H, Carter E, Aloia M, Phillips B. Cross-sectional relationship of reported fatigue to obesity, diet, and physical activity: results from the third national health and nutrition examination survey. Journal of clinical sleep medicine: JCSM: official publication of the American Academy of Sleep Medicine. 2006;2(2):163.
 14. Ghafari sm, shahbazian h, kholghi m, haghdoost m. Relationship between social support and depression in diabetic patients. Scientific medical journal. 2010. Available from: <http://www.uptodate.com/contents/insulin-regular-drug-information>, <http://www.uptodate.com/contents/glyboride-drug-information>, <http://www.uptodate.com/contents/metformin-regular-drug>.
 15. Heuer L, Lausch C. Living with diabetes: perceptions of Hispanic migrant farmworkers. Journal of community health nursing. 2006;23(1):49-64.
 16. Hartz A, Bentler S, Watson D. Measuring fatigue severity in primary care patients. Journal of psychosomatic research. 2003;54(6):515-21.
 17. Profile of Environmental Burden of Disease/Iran Public Health and the Environment Geneva 2009. Available from: <http://www.who.int/Country> profile of Environmental Burden of Disease/IranPublic Health and the Environment Geneva 2009.
 18. Drivsholm T, de Fine Olivarius N, Nielsen ABS, Siersma V. Symptoms, signs and complications in newly diagnosed type 2 diabetic patients, and their relationship to glycaemia, blood pressure and weight. Diabetologia. 2005;48(2):210-4.
 19. Monjamed Z, Pormansour A, Abbas M, Peymani T. Quality of life patients who suffer from diabetes chronic complications. J of Nursing school of Tehran University of Medical Sciences(Hayat). 2006;12(1):55-6.
 20. Moosavi A, Aghayan S, Razavianzade N, Noruzi N, Khosravi A. Depression and general health in type 2 diabetic patients. J of Danesh and Tandorosti. 2009;3(1):44-8.
 21. Larijani B, Bayat M, Gorgani MK, Bandarian F, Akhondzadeh S, Sadjadi SA. Association between depression and diabetes. German journal of psychiatry. 2004;7(1):62-5.
 22. Warren RE, Deary IJ, Frier BM. The symptoms of hyperglycaemia in people with insulin-treated diabetes: classification using principal components analysis. Diabetes/metabolism research and reviews. 2003;19(5):408-14.