Original Research

Assessment of the decreased productivity of patients with diabetes type 2 in the Clinical Endocrynological Center Sofia, Bulgaria

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ABSTRACT[*]

This study aims to assess the influence of type 2 diabetes on the patients' productivity and quality of life.

The WHO's methodology – HLQ (Health and Labor Questionnaire) is applied. Subjects were 38 patients with type 2 diabetes, diagnosed and treated at the Clinical center on endocrinology at the MU-Specialized hospital center for active treatment-Sofia. Control consisted of 100 patients without diabetes.

The results from the study proofs the fact that the patients with type 2 diabetes manage with their day-to-day activities like their colleagues and even better, but they absent from work because of: their illness, experiencing fatigue and insomnia, pain in hands, legs, joints and muscles. They receive hospital treatment because of the insufficient control on their treatment and the advanced diabetes complications. The application of the Osterhaus method establishes that type 2 diabetes is connected with the excess illness-related work loss and with more often "medically related absences". These do not lead to significant indirect productivity costs because these patients are with lower income. The cumulative costs from the sporadic work loss during their whole life are even greater, because of the increased spread of the disease, suboptimum treatment, and many complications and prolonged life duration thanks to the contemporary medicine.

Keywords: Diabetes Mellitus, Type 2. Quality of Life. Sick Leave. Efficiency. Bulgaria.

RESUMEN

Este estudio intenta evaluar la influencia de la diabetes tipo 2 sobre la productividad y la calidad de vida de los pacientes.

Se aplicó la metodología de la OMS – Cuestionario Salud y Trabajo). Los sujetos fueron 38 pacientes con diabetes tipo 2, diagnosticados y tratados en el servicio médico de endocrinología del Hospital Especializado MU para tratamientos activos de Sofía (Bulgaria). El control consistió en 100 pacientes son diabetes.

Los resultaos prueban que el hecho de que los pacientes con diabetes tipo 2 realizan sus actividades diarias como sus colegas e incluso mejor, pero se ausentan del trabajo a causa de: su enfermedad; experimentar fatiga e insomnio; dolor de manos, piernas articulaciones y músculos. Reciben tratamiento hospitalario a causa de control insatisfactorio de su tratamiento; y avance de las complicaciones de la diabetes. La aplicación del método Osterhaus establece que la diabetes tipo 2 esta asociada con excesiva perdida de trabajo relacionada con la enfermedad y con "ausencias relacionadas con médicos" más frecuentes. Esto no lleva a significativos costes de productividad indirectos porque estos pacientes son los de más bajos ingresos. Los costes acumulativos de las pérdidas esporádicas de trabajo durante toda su vida son mayores, por la mayor extensión de la enfermedad, tratamiento no idóneo, y muchas complicaciones y aumento de duración de la vida debido a la medicina moderna.

Palabras clave: Diabetes mellitus tipo 2. Calidad de vida. Baja laboral. Eficiencia. Bulgaria.

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(English)

INTRODUCTION

Diabetes mellitus is a chronic disease that requires long-term medical care, both to limit the development of its devastating complications and to manage them when they occur. It is a disproportionately expensive disease; patients with diabetes accounted for 170 million people world wide according to World Health Organization (WHO) and it predicts that their number may double to 300 million by 2025 because of the rising incidence of obesity in an ageing population.[1]

The number of the Bulgarian diabetic patients is about 400,000. Approximately 90% of the diagnosed patients have type 2 diabetes mellitus.

The diabetic patients live significantly shorter than non-diabetics (average 5 to 10 years). Diabetes is associated with many chronic vascular complications such as retinopathy, nephropathy, and neuropathy.[2,3]

Type 2 diabetes causes also fatigue, frequent urination and lack of concentration during work.[4]

The objective of this study was to investigate the influence of the type 2 diabetes on patients' work productivity.

METHODS

The study population was drawn out with specialists' recommendation from the Clinical center on endocrinology at the MU-Specialized hospital center for active treatment-Sofia, focussing only on patients with type 2 diabetes. From all the 75 patients with type 2 diabetes only 38 agreed to participate in the study and filled in the WHO's Health and Labour Questionnaire (HLQ). The excluding criteria were patients with type 1 diabetes, unemployed or having one or more additional diseases.

The control group is a stratified sample randomly chosen. After the study of the voluntaries there were 161 people without diabetes, that were chosen and that filled in the same questionnaire.

The HLQ, aims to measure time costs due to the disease by:
- asking individuals, on a daily basis, whether they have been engaged in paid work, or been unable to do so due to illness or other reasons;
- measuring productivity losses due to illness without being absent from employment through asking individuals how many additional hours they would have to work to compensate for loss of work time;
- measuring loss of time in unpaid employment, in particular, shopping, caring for children and household work; and
- investigating aspects of illness that impair affected persons from engaging in paid work.[1,5]

The Osterhaus method aims to measure time lost as a result of the efficiency loss when ill individuals continue to go to work. The time lost is measured by the following formula:

$$RP = HWs \times Dmo \times (100\% - PWsx) \times Eн$$

where: RP = reduced productivity; HWs = work off hours (per day) with symptoms; Dmo = work off days (per month), feeling bad; %PWsx = productivity in per cent when feeling bad; Eн = individual hour stake.[6]

The individual income per hour is calculated by the personal annual income, stated by every participant.

In order to compute the work-loss days, the total productivity loss and the cost of this time, we used a Tobit regression technique, because many participants announced value zero for their loss of productivity. We used chi square – the Pearson correlation criterion and the criterion of Likelihood Ratio to evaluate the statistical significance of correlation between the answers and the corresponding factor. It is accepted that such a correlation exists if the p-value is lower than 0.05. This correlation is strongly expressed if $p < 0.001$.

RESULTS

The characteristics of the 38 patients who participated in the study are shown on Table 1.

Table 1.- Main characteristics of the population sample	
Characteristic	Values
Sex	
Female	78,9%
Male	21,1%
Age	53.97 ± 10.18
Duration of diabetes since diagnosis (years)	15.6 ± 8.06
Education	
Basic	12,0%
Secondary	42,0%
Specialized	27,6%
Higher	18,4%
Monthly income	
Without	4,0%
Up to 120 BGN (61 euros)	51,0%
120-250 BGN (61-128 euros)	29,0%
More than 250 BGN (128 euros)	16,0%

It can be seen that there is a prevalence of the female – 78.9%, although the analysis of the data for a 3-years period of time shows that both sexes suffer from type 2 diabetes with a little prevail of women. The average age of the patients is 53.97 years (minimum 23 years, maximum 80 years), and the disease duration since diagnosis is 15.6 years (SD=8.06) and varies from 10 to 37 years. Near half of the patients (42%) are retired, but small part of them continues to work. About half of the patients (54.0%) present basic and secondary education and only 18.4% have a high education and even have masters degree. 55% of the patients have 120 BGN (61 euros) average monthly income or lower. Only 16% are with income above 250 BGN (128 euros), and 29% are with monthly income between 120 and 250 BGN (128 euros). 3% have not communicated their monthly income. According to the collected data, the most often comorbidities are arterial hypertension (60%), high level of cholesterol (37%), hearth diseases (48%) and myocardial infarction (29%). The most frequent symptoms, experienced during the last month, were sleep disturbances, fatigue, pain in hands, feet, joints, muscle pain and headache. They are presented in three degrees - severe, significant and insignificant, according to the subjective patients' assessment (Table 2).

The table 3 shows the results from the answers, connected with the patients' concentration at work during their illness.

The analysis shows that there is a statistically significant correlation between the questions "How do you assess your current health status" and "How do you assess your current psychical health" and the following factors: gross monthly income; availability of frequent and heavy headache; and heart attack.

Table 2. The most frequent symptoms experienced by the diabetes patients.

symptoms	severe		significant		insignificant	
	n	%	n	%	n	%
insomnia	24	63.15	2	5.26	2	5.26
fatigue	18	47.36	8	21.05	8	21.05
foot pain, joint pain, hand pain	14	36.84	6	15.78	8	21.05
muscle pain	8	21.05	4	11.11	4	11.11
headache	8	21.05	4	11.11	12	31.58

Table 3. Patients' work activity with symptoms.

activity assessment	value
Paying attention at work.	
All the time	0
Most of the time	7.7%
Part of the time	7.7%
A very little part of the time	53.8%
Not at all	30.8%
Working at high quality	
All the time	0
Most of the time	0
Part of the time	7.7%
A very little part of the time	23.1%
Not at all	69.2%
Working performance at high level of concentration	
All the time	0
Most of the time	0
Part of the time	15.3%
A very little part of the time	46.2%
Not at all	38.5%

55.0% of the patients are with minimum income (up to 120 BGN about 61 euros) and they assess their health condition as satisfactory or bad (36.8% and 31.6% respectively). Only 16.0% are with income between 250-500 BGN (128-256 euros). and they assess in equal parts (30.3%) their health condition as excellent, very good and satisfactory.

During the second statistical proceeding of the questionnaires the answers for one and the same question, given from the representatives of the main (38 diabetic patients) and of the control (100 healthy patients) groups are compared. The aim is to be determined if there is any statistically significant correlation between the answer and the affiliation of the participant to one of the above mentioned groups. The Likelihood Ratio is applied and the p-values are calculated as indexes of such correlation.

DISCUSSION

The results from this study show the influence of the disease on the patients' productivity. It is observed a significant positive correlation (p<0.001) between the affiliation of the participants to the two different groups and the answers to the questions "How do you assess your health in the moment" and "How do you assess your psychical health in the moment". 28.9% from the diabetic patients assess their current health condition as satisfactory and 31.6% - as bad while only 18.1% state satisfactory and 5% bad in the control group. Near 78% (above 2/3) from the control group assess their health status as excellent, very good and good or the disease diabetes has a negative influence on the self-perception of their health status. The correlation between the answers and the patient's affiliation to one of the groups is statistically significant for the question "Do you suffer from one of the following diseases – frequent and heavy headache; availability of chronic pain; high blood pressure; stroke; chronic lung disease; high cholesterol in the blood; obesity" (p<0.05). This correlation is high when there is diabetes, chronic fatigue and skin cancer (p<0.001).

About half (45%) of the diabetic patients are obese while only 24.5% of the control group are obese. The correlation between the answers and the patient's affiliation to one of the groups is statistically significant for the question "During the last four weeks how often did you feel one of the following symptoms – fatigue, sleep disturbances, pain in the hands, legs, joints, muscle pains" (p<0.05). A strongly expressed statistical correlation between the answers and the patient's affiliation to one of the groups is observed for the question "During the last four weeks how often did you feel yourself sad, desperate, everything was a burden for me" (p<0.001). The correlation between the answers and the patient's affiliation to one of the groups is statistically significant for the question "How many times during the last 12 months you have visited a specialist – dentist, ophthalmologist, psychiatrist" (p<0.05).

This correlation is highly expressed (p<0.001) after the visit of first aid, and ophthalmologist for a plan's operation.

A significant positive correlation is found between the answers and the patient's affiliation to one of the groups for the question "How many twenty-four hours you have spent in a hospital during the last 12

months" (p<0.001). There is no statistically significant correlation for the following conditions: nervous, anxious, and useless. The diabetic patients do not have the feeling that they are useless, but they have some troubles and they have to have "medically related absences" from work because of their disease. There is no statistically significant correlation between the answer of the question "How many working days you have lost because of a working accident" and the affiliation of the patients to one of the groups.

According to the HLQ there were 11 patients from the diabetes group (29%) and 24 patients from the control group (14.3%) that have productivity losses. Although the patients with diabetes have twice more work loss, more disability claims and longer duration of disability, the indirect costs calculated by the Osterhaus formula are 238.88 BGN (about 122.50 €) for the patients with diabetes and 1158 BGN (about 593.84€) for the control group. Thus diabetes can be connected with a lower socio-economical status. On the other hand the lower remunerations can be due to individual and working interrelations.[4,7]

CONCLUSIONS

We can conclude that type 2 diabetes affects patients from the both sexes (with slight female predominance) and as the age increases the relative rate of complications is increasing. There is inadequate control of patients suffering from type 2 diabetes and the complications lead to increase of the symptoms and to increase of the treatment costs. The diabetes patients manage with their working routine like their other colleagues and even better, but they have work losses because of their disease and they also feel difficulties and fatigue because of their disease. Diabetes is associated with a profound negative impact on patients' productivity. Its prevention, the better control, and the delay of diabetes complications will decrease the costs.

ACKNOWLEDGEMENTS

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