Health-related quality of life of prisoners with diabetes mellitus

Abstract

The study explored health related quality of life of prisoners with diabetes mellitus (DM).48 male inmates incarcerated in a Greek prison, completed a demographic and clinical traits questionnaire. Prisoners with DM and those with additional health problems had worse physical, mental health and psychological well-being outcomes ($p = 0.002$, $p< 0.001$ and $p = 0.014$ respectively). People with DM in correctional facilities should receive specialized primary health care services either health services within the correctional institution or community liaison. The implementation of services targeting DM should be evaluated with the target of improving offenders' physical and mental health.

Key words: diabetes mellitus; prisoners; quality of life; psychological wellbeing.

Introduction

More than 10 million people are held in correctional facilities worldwide and this figure constantly increases. Prison population rates vary from 52 to 799 persons per 100 000 inhabitants. In 2015, 11798 people were incarcerated in Greece, representing a median rate of 109 prisoners per 100 000 inhabitants.[1] Despite prisoners' undisputed rights to health and well-being, these rights are often disregarded. Prisoners due to their often deprivileged socioeconomic background and poor life choices carry a higher risk and burden of diseases than the general population. They are more likely to suffer from chronic diseases and obesity, to have high blood pressure and blood sugar.[2] Existing clinical practice and resources focus mainly on transmitted diseases, because epidemiology shows significantly higher risk of prevalence of HIV, hepatitis B and C and tuberculosis than the general population.[3]

Diabetes mellitus (DM) is a serious chronic disease which progressively leads to serious health complications. More than 422 million people suffer from DM globally; the prevalence of the disease has been rising rapidly the last few decades. In 2014, 8.5% of adults above 18 years old had DM. In 2012, it was estimated that 1.5 million deaths were directly caused by diabetes and 2.2 million indirectly by high blood glucose.[4]

According to the American Diabetes Association,[5] prevalence of DM in inmates is similar to community-dwelling population and it is estimated that among 2 million prisoners in correctional institutes in the USA, namely almost 80.000 have DM (prevalence at 4.8%) compared to 8.3% of the general population (ADA 2014). Respectively, in Greece, the small percentage of prisoners with DM (approximately 3%, when in general population patients with DM are around 8.5%) corresponds to similar small percentages of patients with DM in various epidemiology studies worldwide.

Chronically ill prisoners are usually offered a poorer level of health care services compared to patients outside correctional institutions[6] despite the existence of diabetes management guidelines.[7] In addition, lack of medical personnel and appropriate equipment in correctional institutes discourages these procedures and complicates diabetes management.[8] Diabetes management in there should be continued without interruption and should emphasize in physical health promotion, regular screening, availability of medication and medical nutrition therapy.[9] It also requires specific diet restrictions and food availability but also support to adhere to

meals, medications and exercise.[10] Lapses in diabetes care during incarceration could result in an increase in cost for treatment after prisoners' sentence completion and on returning to the community .[11]

Several studies have assessed the impact of correctional institutes' environment on inmates diabetes care. A recent study in Mexico City showed, that a lower performance of health care was observed during incarceration compared to the year prior to incarceration for prisoners with diabetes and hypertension.[12] Lack of care planning and deficiencies in diabetes care in prison environment was also reported in a study within UK correctional institutes, highlighting that suboptimal diabetes care is still the norm.[11] In a study contacted at prisoners in Australia[13] younger prisoners were found to have higher prevalence in diabetes compared to non-prison population suggesting less than ideal diabetic control during incarceration.

Although DM is widely recognized as one of the four priority non-communicable diseases by the World Health Organization,[4] there are few data on prisoners with DM. Inmates are generally excluded from community efforts to improve health outcomes, they are not eligible for nationally based surveys and they often receive lower standard health care services.[14] The prevalence of DM among Greek inmates and evidence whether diabetic offenders receive appropriate care is unknown. Few studies have examined health related quality of life (HRQoL) which can be significantly affected by the conditions of detention.[15]

Evidence suggests that low psychological well-being (PWB) and sleep disturbances are associated with an increased risk of autoimmune diabetes and type 2 diabetes.[16] Moreover, a large cross-national Diabetes, Attitudes, Wishes and Needs (DAWN) study, which took place in 13 countries from Asia, Australia, Europe and North America, reported that 41% of people with diabetes had poor PWB that often affected self-care.[17]

The judicial prison of Larissa has approximately 800 male indictees and convicts and is the second largest male correctional institution in Greece. In Greek correctional institutes, prisoners with DM are given a prescribed diet which is similar to the one the general population follows. Also, they follow a special exercise routine programme which they practice in a place specially designed for them away from other inmates. They are not permitted to handle their own medication and there is a standard procedure in which the prisons' guard accompanies in daily bases the prisoner with DM in the correctional institute medical facility to receive his

medication. If there is the need for any sugar blood testing, this is performed by the nurse or the physician who is member of the staff. All other lab tests are performed in a primary health care structure nearby the correctional institute. However, no special primary care program is implemented in the Greek prison settings as this is the case in most correctional institutes worldwide. (La Cerra et al 2017). According to World Health Organization guidelines, it is essential that prisoners receive primary care services by a group of health professional experts who should preserve their health status optimal the same way they do for general population. (Enggist, Møller, Galea, & Udesen, 2014).

The aim of the present study was to examine the health-related quality of life and psychological well-being of Greek prisoners with diabetes mellitus, and to investigate whether physical and mental HRQoL and PWB were related with demographic and clinical characteristics, health behaviors, attitudes and detention conditions.

Methods

A cross-sectional study was conducted from April to May 2014 in the second largest male correctional institution in Greece.

Sample and data collection

Recruitment flyers for the study were placed in the prison's kitchen and clinic. Participants interested in the study contacted the chief prison officer and appointment was arranged with the researcher. The sample consisted of 48 inmates, 24 with DM (3%) and 24 without DM as a control group. Due to the small number of female prisoners in the prison population, it is estimated around 4.8% of total prison population according to the latest Greek Ministry of Justice report,[18] only men were included. Inclusion criteria were the following: (a) subjects should be willing to participate in the study (b) prisoners should speak and understand the Greek language sufficiently. Inmates who were temporarily staying at the prison for procedural reasons (e.g. to attend a court) were excluded from the study.

The response rate of the study population was 100%. This may be related to the fact that those responsible for completing the questionnaires (nurse and psychologist) were approached by the researcher, work as permanent employees of the correctional

Measures

An anonymous battery of questionnaires was used in this study with the following research tools: a) a demographic and clinical traits questionnaire with questions for health behaviors and conditions of detention, b) Health-related Quality of Life Scale – SF12, c) Psychological wellbeing-PWB.

SF 12

SF-12 is the multipurpose short-form (SF) questionnaire that measures health status of general and specific populations but not prisoners. SF -12 measures eight concepts: physical functioning, role limitations due to physical health problems, bodily pain, general health, vitality, social functioning, role limitations due to emotional problems and mental health. Physical and Mental composite scores (PCS-MCS) are computed using the scores of 12 questions and range from 0-100, where 0 represents the lowest level of health and 100 the highest.[19] In the SF-12 the subscales of health-related quality of life are measured in a scale of 0-100. Grades that tend toward 100 imply better health related quality of life on the total scale, whereas 50 is the mean. The validity of the Greek version of SF-12 was tested and the results were acceptable for use in Greek populations.[20]

Psychological wellbeing-PWB Scale

It consists of eight items describing important aspects of human functioning ranging from positive relationships, to feelings of competence, to having meaning and purpose in life. Each item of the scale is answered on a 1 to 7 scale that ranges from Strong Disagreement to Strong Agreement. All items are phrased in a positive direction. Scores can range from 8 (Strong Disagreement with all items) to 56 (Strong Agreement with all items). Grades that tend to toward 56 imply better well-being on the total scale whereas 28 is the median. High scores signify that respondents view themselves in positive terms in important areas of functioning. Although the scale does not separately provide measures of facets of well-being, it does yield an overview of positive functioning across diverse domains that are widely considered

important.[21] The wellbeing-PWB Scale has been widely used and validated for the Greek population.[22]

Statistical analysis

Continuous variables are expressed as mean (standard deviation) and categorical variables as absolute and relative frequencies. The Kolmogorov-Smirnov test was used to test the normality of the distribution of the continuous variables. Continuous variables followed normal distribution and therefore we applied parametric methods. Multivariate linear regression analysis was applied for the identification of predictive factors that were associated with quality of life and well-being. Independent variables that were significantly associated ($p < 0.05$) with PCS, MCS and PWBin bivariate analyses were included in multivariate modeling. Multivariate analysis was applied in order to adjust for confounding factors. The predictive variables were identified in terms of coefficients beta and their 95% confidence intervals and p-values. Also, adjusted coefficients of determination in final multivariate models were calculated. All statistical analyses were performed using SPSS version 21.0.

Ethical issues

The study protocol was granted ethics approval by the Ministry of Justice, Transparency and Human Rights (Ref.No.11284/8-5-2014). Each participant was informed about the purpose of the study and the fact that confidentiality and anonymity were secured, and they signed a consent statement. The interviewee completed the questionnaire with the presence of a nurse, psychologist or social worker (trained about the aim of the study) in order to explain and answer any question they had.

Results

Sociodemographic and related to Diabetes Characteristics

The mean age of the sample was 50.31 years (*SD*9.93). The DM group was older than the non-DM group (mean 53.70 *SD* 9.87 vs mean 46.91 *SD* 8.94, p=0.033). The majority of the prisoners were high school graduates (39.6%), and there was no

statistically significant difference between the education level of the two groups (p=0.570). Most of the detainees were married (64.6%), of Greek nationality (77.1%) and self-employed prior to incarceration (56.3%), while there was a statistically significant difference between the groups for all of the aforementioned characteristics ($p = 0.043$, $p < 0.001$ and $p < 0.001$ respectively).

[Table 1 about here]

Most of the participants (75%, n= 18) reported they had discovered they suffered from diabetes in random health checks and 16.7% ($n = 4$) during hospitalization. Participants discovered they had DM at a mean age of 43.88 years (SD 14.41). The majority were prescribed oral medications to control their DM (62.5%, $n = 15$) whilst the remaining 37.5% were insulin-dependent. For diabetes management, diet was used as a complementary intervention by 58.3 participants ($n = 14$) and exercise by only 29.2% ($n = 7$).

Health Related Characteristics
High blood pressure was the most frequently reported comorbid condition (22.9% of the reported comorbidities), with other heart problems accounting for about 17% and dyslipidemia accounting for 14.6% of the comorbid conditions. One third (27%) of the participants did not report any comorbidities. Regarding health affecting behaviors, a total of 35.4% were smokers while the majority of the participants did not adhere to a healthy diet and reported low physical status (41.7%) (Table 2).

Prisoners diagnosed with DM had more often higher blood pressure ($p = 0.016$), dyslipidemia ($p = 0.004$) and hepatitis ($p = 0.037$) than their non-diabetic counterparts, and there were statistically significant differences between the two groups regarding physical exercise, smoking and diet ($p = 0.099$, $p = 0.001$ and $p = 0.009$ respectively).

[Table 2 about here]

Characteristics relating to imprisonment and conditions of detention

The majority of the participating prisoners (45.8%, n=22) were sentenced to spend in prison between 6 and 10 years. Almost three quarters of the participants (75%, n=36) worked while being in prison, and a small number of them (8.3%, n= 4) were attending a second chance school (Table 3). Comparing the two groups we found that more prisoners without diabetes were working ($p < 0.001$).

[Table 3 about here]

SF-12 and PWB Scale outcomes
Cronbach's alpha coefficient was 0.758 for SF-12 and 0.869 for PWB. For SF-12, mean values of Physical Component Summary- PCS were 47.63 (SD 12.17) and of Mental Component Summary- MCS was found 44.34 (SD =11.45).

Well - being is measured in a scale of 8-56. The mean score of the sample for PWB was 44.34 (SD 11.45).

Bivariate analyses between independent variables and PCS, MCS and PWB are presented in Table 4. Diabetes mellitus status and health status were related with PCS, MCS and PWB. Exercise was related with PCS and PWB, while smoking was related with PCS, educational level was related with PWB and marital status was related with PCS.

[Table 4 about here]

Multivariate linear regression analyses were applied for the identification of the predictive factors that were independently associated with physical and mental quality of life and well-being (Table 5). Non diabetic married inmates, with no additional health problems, non-smokers and those that exercised more had higher PCS without though these relations being statistically significant at the level of 0.05. Thirty-five per cent of variance of PCS was explained by these five independent variables.

Moreover, non-diabetic inmates with no additional health problems had higher MCS without the associating reaching statistical significance at the level of 0.05, while 13% of variance of dependent variable was explained by these two independent variables.

Finally, higher educated, non diabetic inmates, with no additional health problems and those that exercised more had higher PWB scores. Exercise status and educational level were significantly associated with PWB in the non-diabetes population. Twenty five percent of the variance of PWB score was explained by the above four independent variables.

[Table 5 about here]

Discussion

This study examined health-related quality of life of prisoners with and without diabetes in a large correctional institution in Greece. To our knowledge, this is the first study that examines factors affecting health related quality of life of inmates with diabetes internationally. Thus, it is difficult to make direct comparisons with other similar studies. The convenience sample were 48 inmates (half had DM and half acted as a control group). The ratio of prisoners with diabetes (3%) is lower than general population in Greece (8.5%) and this corresponds to similar international epidemiological studies. For instance, the American Diabetes Association estimates the prevalence of DM in prisoners at a 4.8%, compared to 8.3% of general population.[23] It is believed that inmates did not reject the participation, because the interviewees were employees of the correctional institution and they felt familiar with them, or they considered the subject important, or they had nothing else to do so participation in research was a chance to take them out of their cell. Most of the participants of both groups were Greek (77,1%), married (64,6%), had received secondary education (39,6%) and were self-employed prior to incarceration (56,3%). This mixture reflects the majority of the prisoners' rates sentenced in this penal institution.

According to the literature, morbidity rates are high among prisoners, particularly for chronic, communicable, and sexually transmitted diseases [24-27] compared to the general population[.5] Our study agrees with these findings and adds to the existing evidence by providing rates for a Greek prison sample. Our sample had lower rates of hepatitis B and C compared to inmates in other studies.[28,15] Prisoners with diabetes had lower scores for the physical as well as the psychological aspects of health-related

quality of life than prisoners without diabetes. Also, prisoners without diabetes had higher scores on psychological well-being scale than prisoners with diabetes. Both groups scored at the two subscales (PCS-MCS) less compared to civilians with diabetes out of the prison [29] or to general population in Greece.[20] Our sample scored lower compared to male inmates from another prison in Greece in physical and mental summary components of the SF-36 scale.[15]

The correlation between exercise participation and physical health related quality of life and well-being was significant and this is in accordance with studies for other populations with diabetes.[30] Comorbidities were significantly associated with lower physical QoL. This finding is equivalent to findings for patients with type 2 diabetes in other European countries such as the Netherlands.[31]

We found no statistically significant correlation between HRQoL and demographics in prisoners with self-referred type 1 or type 2 diabetes. This is in agreement with the study by Imayama with the exception of a threshold association between advancing age and HRQoL.[32] Multivariate linear regression analyses revealed that higher exercise and educational level were associated with higher scores on the psychological well-being scale. In that case, the adjusted coefficient of determination was 25%. Although we did not find statistically significant relationships between independent variables and PCS and MCS, the adjusted coefficients of determination were low to medium (35% and 13% respectively).

Limitations and Strengths

Several limitations should be considered when evaluating results. The cross sectional design of the study cannot make inferences about causality (i.e. DM makes quality of life worse or the other way around) and imprints HRQoL and PSB at a given moment that can be influenced by confounding variables not existing at another point of time. Instruments selected for the study, are not validated for prisoners, thus there might be matters of internal consistency. Also, the study population was relatively small. However, it corresponds to the ratio of total number of patients with DM in the general population in Greece and worldwide". However, it was appropriate to raise statistically significant results. Another limitation was that the research team was not allowed to have access to medical files and clinical characteristics that were reported

by participants, so it was not feasible to distinguish prisoners with Type 1 from those who had Type 2 DM .Thus, cross-checking and an objective examination of data were not possible. Despite study limitations, key strengths were that a) this is the first study conducted in such a vulnerable population (prisoners with a chronic disease) in the largest male correctional institution in Greece, b) the response rate of participants was 100% and c) data was obtained from an environment which is difficult to approach, thus study's results could be used by prison managers to provide better treatment for prisoners with DM. Besides, the study tried to fill the gap in understanding diabetes treatment within prison facilities, which is considered a field were data is difficult to obtain and still scarce worldwide.

Conclusions and recommendations for practice

Chronic disease management is becoming increasingly important in correctional settings. People with DM in correctional facilities should receive the same care as other diabetics. Current evidence does not confirm whether diabetes treatment is better controlled or gets worse in prison, thus longitudinal design studies are recommended to identify Greek prisoners' physical health problems and their impact on their wellbeing and mental health. Specialized primary health care services should be provided through correctional institution and community liaison, and the implementation of the services should be evaluated aiming at improving physical and mental health of offenders. It is highly recommended that prisoners with DM are taught by health professionals to self-manage their diabetes by following a special healthy diet and regular exercise program. Given that DM is a complex medical situation which becomes even more complicated in the prisons' environment, a multidisciplinary approach is suggested so that prisoners' health is improved or kept stable. More studies, focused on the efficacy of primary health care programs in correctional institutes are invited to measure plausible positive outcomes.

Finally, future studies should also focus on HRQoL, PSB and diabetes or other chronic diseases, to better understand the factors affecting them with the evaluation of a possible health care or health promotion intervention, and further research studies should include other large correctional institutes with female prisoners.

Declaration of Conflicting Interests

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Table 1. Sociodemographic characteristics of the participants with and without DM

Characteristic	Total	DM Group	Control group	p-value[a]
Ethnicity				<0.001
Greek	37(77.1)	17 (70.8)	20 (83.3)	
Other	11 (22.9)	7 (29.2)	4 (16.7)	
Educational level				0.570
Primary	16 (33.4)	7 (29.2)	9 (37.5)	
Secondary	19(39.6)	11 (45.8)	8 (33.3)	
University	13(27.1)	6 (25.0)	7 (29.2)	
Marital status				0.043
Unmarried	8 (16.7)	3 (12.5)	4 (16.7)	
Married	31 (64.6)	15 (62.5)	16 (66.7)	
Divorced	9 (18.8)	6 (25.0)	3 (12.5)	
Occupation prior to imprisonment				<0.001
Private employee	9(18.8)	4 (16.7)	1 (4.2)	
Civil servant	3(6.3)	11 (45.8)	16 (66.7)	
Unemployed	5 (10.4)	5 (20.8)	4 (16.7)	
Freelance professional	27(56.3)	1 (4.2)	2 (8.3)	
Retired	4(8.3)	3 (12.5)	1 (4.2)	

Values are expressed as n (%).

[a] x^2 test

Table 2. Health related characteristics of the participants with and without DM

Characteristic	Total	DM Group	Control group	p-value[a]
Health conditions				
High blood pressure	11 (22.9)	9 (37.5)	2 (8.3)	0.016*
Heart problems/heart attack	8 (16.7)	4 (16.6)	4 (16.6)	0.551
Dyslipidemia	7 (14.6)	7 (29.2)	0 (0.0)	0.004**
Stroke	2 (4.2)	2 (8.3)	0 (0.0)	0.149
Hepatitis C	3 (6.3)	2 (8.3)	1 (4.2)	0.551
Hepatitis B	4 (8.3)	4 (16.7)	0 (0.0)	0.037*
Smoking status				0.001***
Yes	17(35.4)	7 (29.2)	10 (41.7)	
No	26(54.2)	13 (54.2)	13 (54.2)	
Former smoker	5(10.4)	1 (16.7)	1 (4.2)	
Healthy diet				0.009**
Yes	8(16.7)	5 (20.8)	3 (12.5)	
No	25(52.1)	12 (50.5)	13 (54.2)	
Sometimes	15(31.3)	7 (29.2)	8 (33.3)	
Physical status				0.099
Low	20(41.7)	13 (54.2)	7 (29.2)	
Medium	19(39.6)	9 (37.5)	10 (41.7)	
High	9(18.8)	2 (8.3)	7 (29.2)	

Values are expressed as n (%).

[a] x^2 test, *p<0.05, **p<0.01, ***p<0.001

Table 3. Imprisonment and detention conditions of the participants with and without DM

Characteristic	Total	DM Group	Control group	p-value[a]
Sentence				<0.001***
<5 years	9 (18.8)	5 (20.8)	4 (16.7)	
5-10 years	22 (45.8)	13 (54.2)	9 (37.5)	
>10 years	12 (25)	3 (12.5)	9 (37.5)	
Lifetime	5 (10.4)	3 (12.5)	2 (8.3)	
Work in prison				<0.001***
Yes	36 (75.0)	14 (58.3)	22 (91.7)	
No	8 (16.7)	3 (12.5)	1 (4.2)	
Second chance school	4 (8.3)	7 (29.2)	1 (4.2)	

Values are expressed as n (%).

[a] x^2 test, ***p<0.001

Table 4. Relations between sociodemographic, health status and detention characteristics and HRQoL and PWB

Variable	PCS		MCS		PWB	
	Mean (SD)	P-value	Mean (SD)	P-value	Mean (SD)	P-value
Marital status		0.098[a]		0.736[a]		0.741[a]
Married	49.74 (10.691)		44.75 (11.949)		48.61 (8.065)	
Singles/divorced	43.54 (14.114)		43.54 (10.773)		47.82 (7.501)	
Educational level		0.432[b]		0.647[b]		0.121[b]
Primary	44.54 (12.695)		43.70 (9.694)		45.81 (9.779)	
Secondary	48.49 (12.781)		43.07 (13.377)		48.10 (7.680)	
University	50.25 (10.698)		46.87 (11.067)		51.76 (2.976)	
Age		0.906[a]		0.371[a]		0.881[a]
<55 years old	47.43 (12.89)		44.24 (9.390)		48.56 (7.773)	
>55 years old	48.52 (9.12)		44.44 (13.668)		48.08 (7.993)	
Sentence duration		0.551[a]		0.659[a]		0.999[a]
<10 years	46.82 (13.034)		43.77 (12.039)		48.32 (8.650)	
>10 years	49.06 (10.730)		45.33 (10.636)		48.35 (6.194)	
Diabetes mellitus		0.002[a]**		<0.001[a]***		0.014[a]*
Yes	42.00 (13.764)		39.93 (11.438)		45.58 (9.458)	
No	53.03 (7.304)		48.56 (9.970)		51.08 (4.363)	
Exercise		0.022[a]		0.623[a]		0.012[a]*
Low	42.10 (15.136)		43.32 (11.556)		44.70 (9.459)	
Medium/high	51.38 (7.992)		45.02 (11.552)		50.92 (5.113)	
Smoking		0.049[a]*		0.229[a]		0.961[a]
No	51.34 (8.583)		46.59 (12.250)		48.27 (7.004)	
Yes	44.64 (13.897)		42.51 (10.667)		48.38 (8.551)	
Health status		<0.001[a]***		0.015[a]*		0.004[a]**
Additional health problems	41.97 (13.369)		40.74 (12.102)		45.74 (8.899)	
No health problems	54.64 (4.963)		48.78 (9.022)		51.66 (4.385)	

[a] t-test
[b] one way Anova, *p<0.05, **p<0.01, ***p<0.001

Table 5. Multivariate linear regression analyses with health-related quality of life and well-being as dependent variables

	Unstandardized coefficient b	95% confidence interval for coefficient beta	p-value
PCS[a]			
Non-diabetics vs. diabetics	6.616	0.873 - 14.105	0.082
Non-additional health problems vs additional health problems	4.645	3.576 -12.867	0.260
Medium/high exercise vs low	5.835	-0.628 -12.298	0.076
Non-smokers vs. smokers	5.172	0.735 -11.079	0.084
Married vs. singles/divorced	4.848	-1.504 -11.201	0.131
MCS[b]			
Non-diabetics vs. diabetics	5.972	2.069 -14.013	0.142
Non-additional health problems vs additional health problems	4.295	3.790 -12.380	0.290
PWB[c]			
Non-diabetics vs. diabetics	3.806	-1.325 -8.938	0.142
Non-additional health problems vs additional health problems	0.820	-4.846 - 6.486	0.772
Medium/high exercise vs low	5.014	0.547 - 9.481	0.029
Secondary education vs. primary	2.585	-2.124 - 7.293	0.274
University education vs. primary	6.023	0.795 - 11.251	0.025

[a] $R^2 = 35\%$, p-value for ANOVA<0.001

[b] $R^2 = 13\%$, p-value for ANOVA<0.001

[c] $R^2 = 25\%$, p-value for ANOVA<0.001