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CLINICAL RESEARCH STUDY

Do Patients with Diabetes and Low Socioeconomic Status Receive Less Care and Have Worse Outcomes? A National Study

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ABSTRACT

PURPOSE: The objective of the study was to assess the influence of socioeconomic status (SES) on the care of patients with diabetes.

METHODS: Quality indicators for patients who were taking medication for diabetes were established. Overall compliance with the quality indicators, as well as prevalence of diabetes by age, were obtained from a national database. Patients with national tax exemptions (used as a marker for low SES) were compared to those without.

RESULTS: Of 4,110,852 citizens aged 18-74, 210,988 (5.1%) were receiving medication for diabetes. The prevalence of diabetes reached 19.9% in people aged 65-74. 495,392 citizens had an exemption, and they had a higher prevalence of diabetes that those who did not (15.4% vs. 3.7%). Patients with an exemption had a higher rate of having a yearly HbA1c done, a yearly LDL level done, a yearly eye exam, a yearly urinary protein exam, of being treated with insulin for an elevated HbA1c than those without an exemption. In patients with an exemption there was a lower percentage with an HbA1c less than 7%, a higher percentage with an HbA1c greater than 9%, and a lower percentage with an LDL less than 130. Multivariate analysis showed that exemption status was a predictor of better performance on process measures (LDL test done, OR-1.03, 95% CI 1.01-1.06, HbA1c test done, OR 1.03, 95% CI- 1.01-1.05) and of worse outcomes (high LDL, OR 0.92, 95% CI, 0.90-0.95 and high HbA1c, OR, 0.85, 95% CI, 0.83-0.87).

CONCLUSIONS: In a country with universal healthcare, patients from a lower SES had an increased prevalence of diabetes and had greater adherence to preventive healthcare measures However, they were less successful in meeting target treatment goals.

KEYWORDS: Diabetes; Socioeconomic status; Access to care

Diabetes and its complications are increased in lower socioeconomic status (SES) groups[1-4] and play a major role in the epidemic of cardiovascular and renal disease found in these populations. A variety of reasons have been offered for this observation including an increase of traditional risk factors such as obesity, lack of exercise, smoking in lower SES populations, and psychosocial factors.[4-5] Initiatives to address this inequality have been developed with varying degrees of success.[6] However, it is not clear to what extent inadequate access to preventive healthcare is playing a role in the increased morbidity from diabetes seen in lower SES groups. Analyzing data from countries that provide free universal healthcare to their citizens can help answer this question.

By law every citizen in Israel is entitled to both emergency and preventive healthcare which is provided by 4 government-funded Health Maintenance Organizations

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(HMO). Recently the HMOs under the supervision of the Ministry of Health joined together to develop quality of care indicators, with one of the focuses being diabetes. The purpose of this study was to document whether patients from lower SES groups with diabetes receive less preventive healthcare and have different outcomes than patients from higher groups and the impact of age on these relationships.

CLINICAL SIGNIFICANCE

- In a large national study, patients with diabetes and lower socioeconomic status (SES) received more preventive healthcare than patients with higher SES.

METHODS

As part of a demonstration project on the measurement of healthcare quality in the community, all 4 HMOs which provide healthcare coverage to all the citizens of Israel agreed to provide data on 4 areas of interest: influenza vaccination rates in the elderly, mammography rate in middle aged women, asthma care and diabetes care. A panel of experts recommended focusing on the measurement of adherence to preventive health care and on the results of treatment and developed quality indicators for these goals. For diabetes this included: obtaining a yearly hemoglobin A1c (HbA1c) level, obtaining a yearly LDL cholesterol level, obtaining a yearly eye examination, obtaining a yearly urinary protein level, prescribing insulin for a HbA1c between 7-9%, prescribing insulin for a HbA1c over 9%, and the percentage of patients with an HbA1c under 7%, the percentage of patients with an HbA1c over 9%, and the percentage of patients with an LDL cholesterol less than 130mg/dl.

As all 4 HMOs use a computerized medical record system, they were able to identify patients who were receiving medications for diabetes (insulin or oral agents) and information on the above listed quality indicators for patients ages 18-74 for the year 2003 were transferred anonymously to a centralized database.

As a marker for SES status we used an exemption from paying the national tax which applies to patients in need on the basis of well defined criteria such as income, family size, disability, or new immigrant status.

Statistical analysis

From the database, national prevalence of diabetes by age was obtained, as well as overall compliance with the quality indicators. Overall and within each age group patients without national tax exemptions were compared with those with exemptions for each indicator. Differences were tested for significance using Pearson's chi-square test for categorical variables. We also tested the effects of age and exempt status on process outcome variables using logistic regression models. All reported P values are 2-sided and $P<.05$ was considered significant.

RESULTS

Out of a total population of 4,110,852 adults aged 18-74, there were 210,988 patients (5.1%) who were taking medication for diabetes (Table 1). As expected, the prevalence of diabetes rose with age to a peak of 19.9% in the 65-74 age group. 495,392 citizens (12.1%) had an exemption from the national tax and that group had a significantly higher prevalence of diabetes than those who did not have an exemption (15.4% vs 3.7%).

Process Measures

Patients with an exemption had a higher rate of having a yearly HbA1c done, an LDL cholesterol level done, a yearly eye exam, a yearly urinary protein exam, of being treated with insulin for an HbA1c between 7-9% and for an HbA1c over 9% than those without an exemption (Tables 2, 3). For the first 4 indicators this was true for all age groups except for the 65-74 age group, where patients from the higher SES group had a higher rate of the exams being performed. For the fifth and sixth indicator (insulin treatment for an HbA1c between 7 and 9% and over 9%) this was true for all age groups except the 18-24 group, where patients from the higher SES group had a higher rate of being treated. Multivariate analysis shows a positive effect of exempt status on the process variables of LDL cholesterol determination (OR-1.03, 95% CI, 1.01-1.06) and HbA1c test determina-

Table 1 Patient Characteristics

	Population		Not Exempt		Exempt	
Age (years)	All	DM	All	DM	All	DM
18-44	2,474,786	24,324 (1.0%)	2,342,325	19,957 (0.9%)	132,461	4367 (3.3%)
45-54	756,895	46,268 (6.1%)	666,481	34,448 (5.2%)	90,414	11,820 (13.1%)
55-64	505,931	65,991 (13.0%)	379,927	39,815 (10.5%)	126,004	26,176 (20.8%)
65-74	373,240	74,405 (19.9%)	226,727	40,603 (17.9%)	146,513	33,802 (23.1%)
Total	4,110,852	210,988 (5.1%)	3,615,460	134,823 (3.7%)	495,392	76,165 (15.4%)

DM = patients taking medication for diabetes.

Table 2 Process Measures*

	HbA1c Measured		LDL Measured		Eye Exam	
Age (years)	Exempt (%)	Not-Exempt (%)	Exempt (%)	Not-Exempt (%)	Exempt (%)	Not-Exempt (%)
18-44	73.0	64.8	71.0	62.6	45.4	38.5
45-54	77.8	76.4	79.5	77.7	50.4	45.4
55-64	81.6	80.4	83.8	83.0	56.5	51.7
65-74	81.4	83.3	85.4	86.8	58.9	62.4
overall	80.4	77.9	83.1	79.8	56.0	51.4

*All differences were significant to $P < .01$

tion (OR 1.03, 95% CI, 1.01-1.05) when controlling for gender and age.

Outcome Measures

In the group of patients with an exemption there was a lower percentage with an HbA1c less than 7%, a higher percentage with an HbA1c greater than 9%, and a lower percentage with an LDL less than 130 (Table 4). For the first 2 indicators this was true for all age groups. Multivariate analysis shows a negative effect of exempt status on the outcome variables LDL cholesterol <130 (OR 0.92, 95% CI, 0.90-0.95) and HbA1c< 7% (OR, 0.85, 95% CI, 0.83-0.87) when controlling for gender and age. The negative effect of exempt status on glycemic control seems stronger than its effect on lipidemia.

DISCUSSION

In this large national study we have shown that the prevalence of diabetes is increased among lower SES groups across all age groups in Israel. This confirms the results of similar studies in other counties.[1,2] It has been previously reported that patients with diabetes from lower SES groups received less preventive care than diabetics from higher socioeconomic groups.[3,7] Various reasons for this discrepancy have been offered including patient factors, such as the financial means to follow provider recommendations, and lifestyle differences, along with physician factors such as bias.[8] However, our findings did not confirm this result but on the contrary found more preventive care being performed in the lower SES group as reflected in a higher percentage of patients receiving yearly HbA1c tests, LDL measurements, yearly eye exams and urinary protein evaluations. Reasons for this finding are unclear, but it might be due to the fact that there exists in Israel a system of universal health care guarantying every citizen basic healthcare and open access to physicians. It is unclear why patients in the lower SES group received more preventive health care. Various reasons can be postulated such as more time to go to physicians if they are unemployed, more contact with healthcare providers due to co-morbid conditions, or the fact that they were sicker as manifested by worse outcomes, but these explanations need to be further investigated. The overall trend of patients from lower SES groups receiving more preventive care reversed itself in the 65-74 year old age group for four of the indicators. This may suggest that once patients leave the work force they have more time to focus on their healthcare as reflected in more exams being performed.

It is interesting to note that even with increased preventive healthcare, patients from lower SES groups had worse healthcare outcomes as measured by accepted indicators. A higher percentage had elevated LDL cholesterol and HbA1c levels even though they were prescribed insulin more frequently. It appears that other factors than inadequate access to healthcare or physician bias, are influencing outcomes in this group. Patients from lower SES groups are receiving adequate care, as documented by adherence to screening tests, and physicians are prescribing adequate therapy, as shown by the higher percentage of patients prescribed insulin with an elevated HbA1c. However their outcomes are

Table 3 Process Measures (cont.)*

	Urine Protein Exam		Insulin for HbA1C 7-9%		Insulin for HbA1C >9%	
Age (years)	Exempt (%)	Not-Exempt (%)	Exempt (%)	Not-Exempt (%)	Exempt (%)	Not-Exempt (%)
18-44	47.2	41.6	47.9	43.0	55.2	37.1
45-54	54.1	50.3	27.6	13.4	39.5	20.3
55-64	57.3	54.9	25.0	13.8	36.1	21.0
65-74	55.2	58.4	20.8	18.0	33.1	28.4
overall	55.3	52.8	24.4	18.2	37.3	25.0

*All differences were significant to $P < .01$

Table 4 Outcome Measures*

	HbA1C <7%		HbA1C >9%		LDL <130 mg/dL	
Age	Exempt (%)	Not-Exempt (%)	Exempt (%)	Not-Exempt (%)	Exempt (%)	Not-Exempt (%)
18-44	32.8	36.3	31.7	26.3	70.3	71.8
45-54	29.5	32.1	31.3	25.6	67.8	67.2
55-64	32.9	37.3	24.0	18.6	70.2	70.7
65-74	40.1	44.4	15.5	12.5	71.3	76.0
overall	35.6	38.2	21.7	19.4	70.4	71.7

*All differences were significant to $P < .01$

still worse than patients from higher socioeconomic groups. This points to factors beyond the control of the healthcare system such as lifestyle differences or cultural and psychosocial influences (eg, low decision latitude at work and low sense of coherence) as reasons for the discrepancy in outcomes.[5]

Neurobiological explanations for the direct impact of SES on health have also been offered recently.[9] Our data suggests that quality improvement programs established to improve diabetes related outcomes in low SES groups need to focus their efforts and resources on these factors, in addition to physician directed interventions. Furthermore, quality interventions that reward physicians for reaching established goals in their patient population may unfairly penalize doctors who take care of patients from lower SES. Notwithstanding the previously documented increased access to preventive care, patients from lower SES status healthcare needs are not being met, and more resources are needed to reduce the socioeconomic gap in healthcare outcomes. Despite the fact that there was no documented inequity in the care of diabetics in our study, significant inequality remained between the socioeconomic groups, as reflected by the difference in outcomes.

Study Limitations

Our study has several limitations. It only included patients who received drug therapy for diabetes and not those with diet controlled diabetes in order to ensure conformity in defining diabetes between the HMOs. We do not know the impact of SES on diabetes in the latter group. We used a crude marker for SES; exemption from the national tax but this marker has been used previously in studies in Israel. In the present study, we did not document co-morbidities which could certainly impact on healthcare usage and outcomes. We only studied patients younger than seventy-five and further studies should look at the impact of SES on geriatric patients with diabetes. The study was only performed in one country and as mentioned above might only be applicable to countries with similar healthcare systems. If our results are confirmed in other countries this might demonstrate the advantages of a universal government funded healthcare system in approving access to lower SES groups. The outcomes we used in our study were surrogate markers (LDL and HgA1c levels), but numerous studies have shown that diabetics who have lower LDL[10] and HbA1c[11] levels have better outcomes, and we see no reason why it should not be true in our study.

CONCLUSION

We have shown that diabetic patients from lower SES groups had increased access to healthcare than patients from higher SES groups but nevertheless had somewhat worse outcomes. Reasons for these lower than expected outcomes need to be further investigated in multi-national studies, and cost-effective interventions need to be urgently developed.

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