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Psychological Insulin Resistance Among Low-Income, U.S. Racial Minority Patients with Type 2 Diabetes

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Abstract

Aims—To examine psychological insulin resistance (PIR), the unwillingness to accept insulin therapy, within a unique U.S. population of patients with diabetes.

Methods—A cross-sectional survey of PIR among low-income, U.S. Latino and African-American (AA) patients with type 2 diabetes recruited from a diabetes specialty clinic.

Results—Data from 136 insulin-naïve respondents (57% female, 69% Latino, mean age 51.1 ± 10.3 years; \$200–\$1,000 median monthly household income; grade 8–12 median education) revealed a 48% prevalence of complete unwillingness to begin insulin. In comparing Latinos to AA, Latino respondents were younger, lived fewer years in the U.S., had less education, were more likely unwilling to use insulin (53% vs. 30%, $p = 0.03$), and reported a more negative attitude to 8 of 9 PIR domains ($p = 0.01$ for each). Fewer years in the U.S. predicted greater unwillingness and a more negative attitude on 8 of 9 PIR domains ($p = 0.03$ for each); and less education predicted greater feelings of unfairness ($p = 0.01$).

Conclusions—PIR is highly prevalent among low income, U.S. Latino patients with type 2 diabetes. Our data may help to better guide culturally appropriate counseling regarding insulin use.

Keywords

Insulin therapy; Psychological barriers; Racial minority

Introduction

“Psychological insulin resistance” (PIR) refers to a person’s opposition towards the use of insulin. The phenomenon may apply to patients or providers, although usually the former, and has been reported to be highly prevalent across diverse populations of adult patients

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Conflict of Interest Statement

None of the authors have any relevant conflicts of interest to disclose with respect to the research presented in this study.

with diabetes [1–8]. The prevalence of complete unwillingness to use insulin among insulin-naïve individuals, even if medically necessary, has been estimated to be almost 40% in previously published surveys [6, 7]. However, no previous studies have surveyed its prevalence specifically in a low-income, U.S. racial minority population, a demographic group that is disproportionately affected by diabetes [9, 10]. To explore potential strategies to enhance insulin use in this demographic group, we surveyed the prevalence and characteristics of PIR among our inner city, minority patients with diabetes.

Methods

The Diabetes Specialty Clinic at the Martin Luther King Jr. Multi-Service Ambulatory Care Center in South Los Angeles, California, USA, serves a large inner city population of low-income, racial minority (almost exclusively Latino and African-American (AA) patients with diabetes. The survey for PIR was administered to consecutive adult patients with type 2 diabetes who had no known history of insulin use, and who were attending regularly scheduled clinic visits. We assessed the nature and extent of PIR using the Survey for People Who Do Not Take Insulin (SPI), the same survey used in previous reports [2, 11]. Key components of this survey instrument include whether the respondent has ever used insulin; the respondent's willingness to use insulin (*"If your doctor recommended that you start insulin, how willing would you be to take it?"*) as rated on a 4-point Likert scale ranging from "very willing" to "not willing at all"; and their agreement with 9 different domains of PIR (each stated as a negative attitude, and rated on a 6-point Likert scale ranging from "strongly agree" to "strongly disagree"). We also surveyed socio-demographic variables relevant to our population, including race, monthly family income, years living in the U.S., and highest educational level attained. Spanish versions of the survey were provided for anyone not sufficiently fluent in English, and all surveys were self-administered by the patient, unless the patient had severe literacy challenges, in which case the survey was read to the patient by the clinic provider or a family member, with the stipulation that all responses had to exclusively represent the patient's views. The study protocol was reviewed and exempted from informed consent requirements by the Institutional Review Board of Charles R. Drew University of Medicine and Science, as individual responses were collected from subjects anonymously.

Analyses were restricted to those respondents who additionally self-reported no previous exposure to insulin, defined as the absence of any previous temporary insulin use, including during hospitalizations or gestational diabetes. Incomplete responses to continuous variables were imputed using the group mean; incomplete responses to nominal or ordinal variables were not imputed. In addition to descriptive statistics, we compared Latino and AA respondents using Student's t-test or the Mann-Whitney test for continuous parametric and non-parametric variables, respectively; the χ^2 test for nominal variables; or the Mann-Whitney test for ordinal variables for which rank scores were arbitrarily assigned. Specific rank scores assigned to the various categories of each variable (monthly household income, number of years living in the U.S., highest level of education achieved, willingness to use insulin, and agreement with each PIR domain) are all shown in Table 1. A negative belief score, previously defined [2] as the number of PIR domains on the SPI for which the respondent reported any agreement, was also calculated for each respondent.

We also performed logistic regression analyses on the full cohort of insulin-naïve subjects, as well as each of the Latino and AA subsets, for the ability of socio-demographic variables (age, gender, race, diabetes duration, household income, years in the U.S., and education level) to predict willingness to use insulin (not willing at all vs. any degree of willingness) or agreement with each of the 9 PIR domains (any agreement vs. any non-agreement). Analyses were performed with SPSS version 18; statistical significance was $p < 0.05$.

Results

We administered the SPI survey to 156 patients over a 4-month period, of whom 136 (87%) reported being completely insulin-naïve; the other 20 respondents reported prior exposure to insulin and were thus excluded from further analyses. Descriptive data are shown in Table 1; the mean age and diabetes duration of all insulin-naïve respondents were 51 ± 10 and 6.9 ± 6.9 years, respectively. There was a preponderance of females and Latino individuals; 94% of respondents were either Latino or AA, and their low-income and low-education status was apparent. Excluding 17 insulin-naïve respondents who did not provide an answer to the question of willingness to use insulin, 57 out of the remaining 119 respondents (48%) reported being completely unwilling to use insulin, even if prescribed by a physician (Table 1). Among the individual PIR domains, the median of the distribution of responses for each domain tended towards agreement with each negative statement regarding insulin.

In comparing Latino vs. AA patients (Table 1), Latino patients were slightly but significantly younger, had a substantially lower education level, were more recently immigrated, and were less willing to accept insulin; 53% of Latino respondents who stated their willingness to accept insulin reported complete unwillingness, as compared to 30% among AA respondents ($p = 0.03$). For each PIR domain, Latinos reported greater agreement with each negative statement (i.e., lower median scores; Table 1), statistically significant for every domain except one, for which a trend was still seen. The negative belief score was also significantly higher for Latino patients (6.9 vs. 4.6; $p < 0.001$).

In the logistic regressions (Table 2), age, diabetes duration, and income were not independent predictors of any of the dependent variables, and relationships for AA were not statistically reliable due to the small numbers of respondents (data not shown). Male gender independently predicted the perception of a restrictive quality of life, and being Latino independently predicted the perception of personal failure. The number of years living in the U.S. was a strong and independent predictor of almost all PIR domains, particularly among Latino patients; more years in the U.S. was associated with less unwillingness and less agreement with each negative statement. Higher education independently predicted a lesser perception of lack of fairness.

Discussion

In our unique, low-income, and poorly educated racial minority population of insulin-naïve patients with diabetes, 48% reported a complete unwillingness to accept insulin, a higher prevalence than all previous publications. Using the same SPI survey tool, Polonsky et al. reported a 28.2% prevalence of unwillingness among attendees at a multi-city diabetes conference (35.1% among racial minorities) [2], and Larkin et al. reported a 33% prevalence [11] in a largely Caucasian, employed, and well-insured cohort of subjects. Neither of these two surveys had substantial representation of Latino or AA minorities, nor people of low-income status; although, in an interim report of the former survey [12], a small number of Hispanic, insulin-naïve respondents with diabetes (11% of 165, or 18 individuals) reported a 72.2% prevalence of unwillingness (13 individuals). Indeed, our AA respondents may be more similar to these two published reports, with a prevalence of 30%, albeit based on a small number of subjects. However, it is our Latino subset that largely accounts for our unique findings, with its 53% prevalence of unwillingness. The 73% prevalence among Japanese patients reported by Okazaki et al. [8] reflected a “reluctance” to use insulin among Japanese subjects, so their estimate may not be exactly analogous to ours.

A recent review highlighted the relative lack of PIR studies in such high-risk demographic groups [13], and while the report of Hunt et al. focused exclusively on Mexican-American

patients with diabetes, they did not quantify the prevalence of unwillingness among their patients [14]. The DAWN study conducted across 13 nations found substantial variations in attitudes towards insulin [1], and the recent report of the SHARED survey [6] that involved seven European nations and the U.S. reported an overall 17.2% prevalence of unwillingness, with variation across countries that ranged as high as 37.3%. However, Latino countries were not included in either of these two surveys, so we cannot discern if our uniquely high prevalence of unwillingness among our Latinos may be more related to their country of ancestry or the unique traits of their urban, immigrant status.

Like many previous reports, there was general agreement with all of the negative statements regarding insulin use, particularly among our Latino patients, who reported more negative attitudes toward insulin than our AA patients. Polonsky et al. [2] found a mean negative belief score of 3.1 in their mixed-race population, in contrast to a score of 6.9 in our Latino subjects. Misconceptions regarding adverse effects of insulin are common and multifaceted among U.S. Latinos [15]. The belief that insulin may be the cause of either blindness or other serious health problems was cited by 25% and 43% of Mexican-Americans, respectively [14], and frequently reported by our own Latino patients as well. Moreover, consistent with the fact that acculturation can have varied effects on lifestyle behaviors among Latinos [16], we observed that greater acculturation among our Latino patients (as suggested by more years living in the U.S.) was a strong and independent predictor of less negative attitudes, and that Latino ancestry predicted a greater sense of personal failure with the prospect of insulin use. These observations are all consistent with the phenomenon of prevalent negative cultural beliefs regarding insulin among U.S. Latinos that may be mitigated by acculturation, possibly in relation to patients' cumulative exposure to a more supportive healthcare environment over time.

Although we encountered no difficulties in carrying out this study, our findings are clearly limited by the relatively small sample size, especially for the AA subgroup, so only limited conclusions can be drawn. The SPI is also only one survey instrument, and other complementary survey instruments would have been helpful to adjust for confounding influences such as overall low quality of life or coexisting emotional distress or depression. And of course, as a cross-sectional survey of beliefs and attitudes, our findings cannot infer any causality nor predict patients' actual insulin use behaviors. We also cannot implicate any specific psychological or experiential factors without specifically investigating each aspect of PIR in greater depth.

In conclusion, ours is the first direct measurement of PIR specifically in an indigent, low-income, racial minority (largely Latino) population, and we found that complete unwillingness to begin insulin, and negative attitudes toward insulin are not only highly prevalent, but appear to be more so than in other populations previously reported. Number of years living in the U.S. is an important inverse predictor of unwillingness as well as other negative beliefs and attitudes, especially among Latinos. For the practicing clinician, our findings highlight the complex nature of PIR and its interactions with the unique socioeconomic circumstances of specific patient subpopulations, and how the clinician should be sensitive to these multifaceted aspects of patients' attitudes toward insulin therapy. Greater familiarity with the various psychological dimensions that contribute to a given patient's PIR, in the context of the patient's cultural and socioeconomic circumstances, will assist clinicians in tailoring their counseling and teaching toward each individual's unique PIR profile, thus potentially fostering greater understanding and trust between the patient and the provider, and hopefully translating into greater effectiveness of treatment. Our data also highlight additional avenues of future investigation with respect to PIR in disadvantaged populations, such as the specifics of cultural myths and misunderstandings related to insulin use, specific aspects of acculturation that may predict or

facilitate greater acceptance of insulin, or the exact psychosocial dimensions of the perceived unfairness, personal failure, and negative quality of life. Such knowledge may ultimately help clinicians to better implement culturally appropriate counseling regarding insulin use in such high-risk, indigent populations.

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References

1. Peyrot M, Rubin RR, Lauritzen T, et al. Resistance to insulin therapy among patients and providers: results of the cross-national Diabetes Attitudes, Wishes, and Needs (DAWN) study. *Diabetes Care*. 2005; 28:2673–2679. [PubMed: 16249538]
2. Polonsky WH, Fisher L, Guzman S, et al. Psychological insulin resistance in patients with type 2 diabetes: the scope of the problem. *Diabetes Care*. 2005; 28:2543–2545. [PubMed: 16186296]
3. Petrak F, Stridde E, Leverkus F, et al. Development and validation of a new measure to evaluate psychological resistance to insulin treatment. *Diabetes Care*. 2007; 30:2199–2204. [PubMed: 17575092]
4. Nam S, Chesla C, Stotts NA, et al. Factors associated with psychological insulin resistance in individuals with type 2 diabetes. *Diabetes Care*. 2010; 33:1747–1749. [PubMed: 20435797]
5. Pan C, Yang W, Jia W, et al. Psychological status of Chinese patients with Type 2 diabetes: data review of Diabcare-China studies. *Diabet Med*. 2012; 29:515–521. [PubMed: 21913961]
6. Polonsky WH, Hajos TR, Dain MP, Snoek FJ. Are patients with type 2 diabetes reluctant to start insulin therapy? An examination of the scope and underpinnings of psychological insulin resistance in a large, international population. *Curr Med Res Opin*. 2011; 27:1169–1174. [PubMed: 21469914]
7. Woudenberg YJ, Lucas C, Latour C, Scholte Op Reimer WJ. Acceptance of insulin therapy: a long shot? Psychological insulin resistance in primary care. *Diabet Med*. 2012; 29:796–802. [PubMed: 22150962]
8. Okazaki K, Goto M, Yamamoto T, et al. Barriers and facilitators in relation to starting insulin therapy in type 2 diabetes (abstract). *Diabetes*. 1999; 48(Suppl 1):A319.
9. Carter JS, Pugh JA, Monterrosa A. Non-insulin-dependent diabetes mellitus in minorities in the United States. *Ann Intern Med*. 1996; 125:221–232. [PubMed: 8686981]
10. Agardh E, Allebeck P, Hallqvist J, et al. Type 2 diabetes incidence and socio-economic position: a systematic review and meta-analysis. *Int J Epidemiol*. 2011; 40:804–818. [PubMed: 21335614]
11. Larkin ME, Capasso VA, Chen CL, et al. Measuring psychological insulin resistance: barriers to insulin use. *Diabetes Educ*. 2008; 34:511–517. [PubMed: 18535324]
12. Polonsky WH, Fisher L, Dowe SK, Edelman SV. Why do patients resist insulin therapy? (abstract). *Diabetes*. 2003; 52(Suppl 1):A417.
13. Wang HF, Yeh MC. Psychological resistance to insulin therapy in adults with type 2 diabetes: mixed-method systematic review. *J Adv Nurs*. 2012; 68:743–757. [PubMed: 22050365]
14. Hunt LM, Valenzuela MA, Pugh JA. NIDDM patients' fears and hopes about insulin therapy. The basis of patient reluctance. *Diabetes Care*. 1997; 20:292–298. [PubMed: 9051375]
15. Hatcher E, Whittemore R. Hispanic adults' beliefs about type 2 diabetes: clinical implications. *J Am Acad Nurse Pract*. 2007; 19:536–545. [PubMed: 17897118]

16. Ghaddar S, Brown CJ, Pagan JA, Diaz V. Acculturation and healthy lifestyle habits among Hispanics in United States-Mexico border communities. *Rev Panam Salud Publica*. 2010; 28:190–197. [PubMed: 20963266]

Table 1

Demographic Characteristics and Responses of All Insulin-Naïve Subjects

Demographic Characteristics				
	All Insulin-Naïve N = 136	Latino N = 94	African-American N = 34	p *
Age (years); Mean $\pm$ SD	51.1 $\pm$ 10.3	49.9 $\pm$ 10.4	54.6 $\pm$ 8.4	0.02
Gender (Female/Male); n (%) **	77 (57) / 58 (43)	56 (60) / 38 (40)	16 (47) / 18 (53)	0.21 †
Race (Latino/African-American/Other); n (%)	94 (69) / 34 (25) / 8 (6)	94 (69)	34 (25)	--
Diabetes Duration (years); Mean $\pm$ SD	6.9 $\pm$ 6.9	6.9 $\pm$ 5.4	6.8 $\pm$ 10.5	0.25
Monthly Household Income; median score (IQR) ^a	2 (2,3)	2 (2,3)	2 (1,3)	0.29
Years in the U.S.; median score (IQR) ^b	3 (2,3)	3 (2,3)	3 (3,3)	0.001
Highest Education Achieved; median score (IQR) ^c	2 (1,2)	1 (1,2)	3 (2,3)	<0.001
PIR Survey Responses				
Willingness to Use Insulin; median score (IQR) ^d	3 (2,4)	4 (2,4)	3 (1,4)	0.047
Respondents Completely Unwilling; n (%) ^e	57 (48)	44 (53)	9 (30)	0.03 †
PIR Domains; median scores (IQR) ^f				
Expected Harm: "I've heard that taking insulin can cause problems, like blindness"	3 (2,5)	3 (2,5)	5 (3,5)	0.004
Illness Severity: "Taking insulin means my diabetes will become a more serious disease"	2 (1,2)	1 (1,2)	2 (1,5,3)	0.006
Restrictiveness: "Taking insulin will restrict my life; it would be harder to travel, or eat out, or even have a life!"	2 (2,4)	2 (1,3)	4 (2,5)	<0.001
Lack of Fairness: "I've done everything I was supposed to do, so if I had to take insulin, that just wouldn't be fair"	2 (2,5)	2 (2,3)	5 (2,5,5)	<0.001
Anticipated Pain: "I don't think I could take the needle every day; it would be just too painful"	2 (1,4)	2 (1,3)	2.5 (2,5)	0.01
Hypoglycemia: "Taking insulin might cause serious problems with low blood sugars"	2 (2,4)	2 (1,3,5)	4 (2,5)	<0.001
Low Self-Efficacy: "I'm not confident I could handle the demands of insulin, like deciding how much to take and when to take it"	2 (2,4)	2 (2,4)	3 (2,5)	0.09
Personal Failure: "Taking insulin means I had failed, that I hadn't done a good enough job taking care of my diabetes"	2 (1,3)	2 (1,2)	3 (2,5)	<0.001
Permanence: "I've heard that once you start insulin, you can never quit"	2 (1,4)	2 (1,3)	4 (2,5)	<0.001
Negative Belief Score ^g ; Mean $\pm$ SD	6.3 $\pm$ 2.7	6.9 $\pm$ 2.4	4.6 $\pm$ 2.6	<0.001

* p value for comparison between Latino and African-American subgroups: by Student's t-test for age, by

† χ^2 test for categorical variables, and by Mann-Whitney test for all other variables.

** One insulin-naïve respondent did not report gender.

^a Monthly income rank scores assigned as: 1 = \$0 – \$199, 2 = \$200 – \$1,000, 3 = Over \$1,000.

^b Years in the U.S. rank scores assigned as: 1 = Less than 5 years, 2 = 5 – 15 years, 3 = Over 15 years.

^c Highest education rank scores assigned as: 0 = No formal education, 1 = Grade 1 – 7, 2 = Grade 8 – 12, 3 = Beyond grade 12.

^dWillingness rank scores assigned as: 1 = Very willing, 2 = Moderately willing, 3 = Slightly willing, 4 = Not willing at all.

^eExcluding all non-responders to this question: 17 subjects overall (11 Latinos, 4 African-Americans, 2 Other race, not shown)

^fAgreement rank scores for each PIR domain assigned as: 1 = Strongly agree, 2 = Agree, 3 = Mildly agree, 4 = Mildly disagree, 5 = Disagree, 6 = Strongly disagree.

^gNegative belief score is defined as the number of PIR domains for which there is any agreement (possible range 0 to 9).

IQR, interquartile range; PIR, psychological insulin resistance.

Table 2

Logistic Regression Analyses

Dependent Variables:	Independent Variables:			
	Gender	Race	Years in U.S.	Education
All Respondents (n = 136)				
Unwillingness *			0.80 (<0.001)	
Expected Harm †			0.31 (0.002)	
Illness Severity †			0.21 (0.03)	
Restrictiveness †	Males: 3.0 (0.04)		0.27 (0.02)	
Lack of Fairness †			0.17 (0.006)	0.35 (0.01)
Anticipated Pain †			0.19 (0.007)	
Hypoglycemia †			0.20 (0.005)	
Low Self-Efficacy †			0.26 (0.004)	
Personal Failure †		Latinos: 5.0 (0.04)	0.30 (0.06)	
Permanence †			0.27 (0.01)	
Latino Respondents (n = 94)				
Unwillingness *		N/A	0.55 (<0.001)	
Expected Harm †			0.25 (0.001)	
Illness Severity †			0.11 (0.04)	
Restrictiveness †			0.15 (0.02)	
Lack of Fairness †			0.08 (0.02)	
Anticipated Pain †			0.16 (0.02)	
Hypoglycemia †			0.33 (0.04)	
Low Self-Efficacy †			0.24 (0.007)	
Personal Failure †			0.12 (0.06)	
Permanence †			0.23 (0.02)	

Results expressed as odds ratios for unwillingness or agreement with each respective negative statement (p value); only odds ratios with $p < 0.10$ are shown, blanks indicate associations with $p \geq 0.10$

* Not willing at all vs. any degree of willingness

† Any degree of agreement vs. any degree of disagreement

N/A, not applicable