Patient-Centered Medicine and Self-Care of Patients with Type 2 Diabetes: A Cross--Sectional Study

A Medicina Centrada no Paciente e os Autocuidados dos Doentes com Diabetes Tipo 2: Um Estudo Transversal

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ABSTRACT

Introduction: Even though the prevalence rate of diabetes in Portugal is one of the highest in Europe, no studies on the association between patient centered medicine, diabetes self-care, and glycemic control have been published. Assuming that patient centered medicine increases adherence to treatment through the improvement of the doctor-patient relationship, the aim of this study was to assess the influence of patient-centered medicine on the self-care of patients with type 2 diabetes patients' (T2DM) in two Family Health Units in Central Portugal, according to gender and age.

Material and Methods: A cross-sectional study was conducted in two Family Health Units in Central Portugal between the 25th November 2021 and the 15th January 2022. Patients with type 2 diabetes were invited to fill in the Patient-Centered Medicine questionnaire, for patients (PCM-p) (where higher values represent worse results) and the Summary of Diabetes Self-Care Activities Measure (SDSCAM), (where higher values represent better results), while healthcare professionals filled in the epidemiologic variables on pre-defined days.

Results: A sample of 298 patients with type 2 diabetes was studied. Linear regressions for the association between SDSCAM scale factors and PCM-p showed significant associations for general diet (β = -0.07, $p < 0.001$), specific diet (β = -0.10, $p < 0.001$), exercise (β = -0.03, $p = 0.008$), foot care (β = -0.11, $p < 0.001$) and medication adherence in general (β = -0.06, $p = 0.001$). Multiple linear regression including the association between glycated hemoglobin (HbA1c) and the SDSCAM scale dimensions showed that specific diet was associated with lower HbA1c levels (β = -0.01, $p = 0.007$) and blood sugar testing (β = 0.01, $p < 0.001$) and that a higher score in PCMp was associated with higher HbA1c levels (β = 0.06, $p < 0.001$). Male patients (β = -6.93, $p = 0.007$) and older patients (β = -0.42, $p = 0.001$) were associated with lower scores in the specific diet. The male gender was associated with higher scores in exercise (β = 7.62, $p = 0.029$), lower scores in foot care (β = -6.06, $p = 0.029$) and lower scores in medication adherence to injectable medicines/6.2 (β = -0.73, $p = 0.018$). Age was associated with a lower score in medication (β = -0.03, $p = 0.045$) and a higher PCMp total score (β = 0.07, $p = 0.030$).

Conclusion: Patient-centered medicine in type 2 diabetics is associated with better self-care behaviors in patients with type 2 diabetes. Gender and age differences were observed in self-care behaviors and age differences were observed in Patient Centered Medicine.

Keywords: Blood Glucose Self-Monitoring; Diabetes Mellitus, Type 2; Family Practice; Patient-Centered Care; Portugal; Self Care

RESUMO

Introdução: Apesar de Portugal ser um dos países com maior prevalência de diabetes, não existem estudos que relacionem a medicina centrada no paciente com autocuidados e controlo glicémico. Partindo do pressuposto de que a medicina centrada no doente aumenta a adesão terapêutica em resultado da melhoria da relação médico-doente, pretendeu-se verificar com este estudo a influência deste modelo de Medicina nos autocuidados da diabetes tipo 2, em duas unidades de Saúde Familiar do Centro de Portugal, segundo o sexo e a idade.

Material e Métodos: Estudo transversal em duas unidades de Saúde Familiar da região Centro, entre 25 de novembro de 2021 e 15 de janeiro de 2022. Os doentes com diabetes tipo 2 preencheram os questionários *Summary of Diabetes Self-care Activities* e *Patient Perception of Patient Centeredness*, e a equipa de saúde preencheu as variáveis epidemiológicas em dias pré-definidos.

Resultados: Reuniu-se uma amostra de 298 diabéticos tipo 2. As regressões lineares para a associação entre as dimensões da escala *Summary of Diabetes Self-care Activities* e as da *Patient Perception of Patient Centeredness* mostraram associações significativas relativamente à dieta geral (β = -0,07, $p < 0,001$), à dieta específica (β = -0,10, $p < 0,001$), ao exercício, (β = -0,03, $p = 0,008$), aos cuidados dos pés (β = -0,11, $p < 0,001$) e à adesão à medicação em geral (β = -0,06, $p = 0,001$). A regressão linear múltipla para a hemoglobina glicada com as dimensões significativas da *Summary of Diabetes Self-care Activities* mostrou uma associação entre a dieta específica e menor valor de hemoglobina glicada (β = -0,01, $p = 0,007$), e que valores superiores de glicémia capilar (β = 0,01, $p < 0,001$) e maior pontuação na *Patient Perception of Patient Centeredness* estavam associados a uma maior hemoglobina glicada (β = 0,06, $p < 0,001$). O sexo masculino (β = -6,93, $p = 0,007$) e idosos (β = -0,42, $p = 0,001$) foi associado a menor pontuação na dieta específica. O sexo masculino foi associado a maiores níveis de exercício (β = 7,62, $p = 0,029$), menores cuidados dos pés (β = -6,06, $p = 0,029$) e menor pontuação na adesão à medicação injetável (β = -0,73, $p = 0,018$). A idade avançada foi associada a menor pontuação na medicação 6.2 (β = -0,03, $p = 0,045$) e maior pontuação na *Patient Perception of Patient Centeredness* (β = 0,07, $p = 0,030$).

Conclusão: A medicina centrada associou-se a melhores comportamentos de autocuidado em doentes com diabetes tipo 2. Foram observadas diferenças nos autocuidados relativamente ao género e à idade e na medicina centrada no doente relativamente à idade.

Palavras-chave: Autocuidado; Automonitorização da Glicemia; Diabetes Mellitus Tipo 2; Medicina Centrada no Paciente; Medicina Familiar; Portugal

INTRODUCTION

Diabetes is a major cause of death and disability globally. It is one of the most common noncommunicable diseases and its prevalence rate continues to grow, affecting 463 million adults (in 2019).[1-3]

In 2020, diabetes affected 14.2% of the Portuguese population aged 20 to 79 years, making Portugal one of the

European countries with highest prevalence rate of diabetes, according to the International Diabetes Federation (IDF).[3,4]

Diabetes self-care activities contribute to successful self-management. These self-care behaviors have a positive correlation with glycemic control, better quality of life and reduction of diabetic complications, and can be evaluated by the Summary of Diabetes Self-Care Activities (SDSCA).[4]

Multiple demographic, socio-economic and social factors can positively influence self-care activities of patients with diabetes. However, the clinician's role in promoting self-care remains vital.[5]

According to the American Diabetes Association and the IDF, patient-doctor communication should be advocated in the management of diabetes[3] as it improves disease knowledge, quality of life self-care and better glycemic control. However, poor communication is a very common patient complaint and it causes[6] patients to avoid discussing self-care problems with doctors.[7]

Patient-centered medicine (PCM) is a clinical method with evidence of promoting a better relationship between doctor and patient, enabling and empowering the patient, and thus facilitating adherence to treatment.[8,9]

According to Stewart *et al*, it is based on four components: (1) exploring health, illness, and illness experience; (2) understanding the patient as a whole; (3) seeking understanding; and (4) improving the doctor-patient relationship. These components are measured considering the patients' perspective.[9]

An improved doctor-patient relationship as well as an increased patient education and knowledge about diabetes are likely to increase the awareness and adherence to self-care.[9,10]

A review article advocates that PCM allows a 1% reduction in blood glucose and in HbA1C levels.[11] It also increases therapeutic adherence, knowledge about the disease and the commitment in decision-making.[11] This study was motivated given the absence of published Portuguese studies on both topics simultaneously.

The aim of this study was to ascertain if the practice of PCM, in the patient's perspective, the PCMp, influenced self-care behaviors in T2DM patients from two Primary Care practices, the Family Health Units (FHUs) Mondego and Manuel da Cunha. Furthermore, this study also determined the association between PCMp and self-care activities in glycemic control by HbA1c value, considering gender and age.

We hypothesized that PCMp practice was associated with better self-care activities and improved glycemic control.

MATERIAL AND METHODS
Ethical considerations

The Ethics Committee of the Central Portugal Regional Health Administration approved this study. Written agreements from the authors of the scales, authorization from the technical council of the FHUs, as well as patient informed consent were obtained.

Design and population

A cross-sectional study was conducted in the 1321 adult patients of both the Mondego and Manuel Cunha FHU´s T2DM patient population. Sample size was calculated using an online calculator, available on the website *praticaclinica.com.br,* for a confidence interval of 95% and error margin of 5%. Using the *praticaclinica.com.br* website, the following formula was applied: $n = N.Z^2.p.(1-p) / Z^2.p.(1-p) + e^2.N-1$, where N = population size, Z = critical value of the normal distribution at the required confidence level, p = sample proportion, e = margin of error. Participants were allocated based on the pre-defined days of study performance, decided by the authors. As exclusion criteria, patients with cognitive impairment due to dementia or severe diabetic retinopathy or with reading and comprehension difficulties were not included.

All T2DM patients with a diabetes consultation during the study period were invited by the administrative staff of the FHUs.

Procedures

After invitation, the patients completed the informed consent form which included a precedent explanation about all aspects of the study that was written in an accessible away for patients. The invitation was followed by filling in the SDCA Summary of Diabetes Self-Care Activities scale (SDSCA), while waiting for the medical appointment, and the PCMp scale was completed at the end of the medical appointment. Both scales are adapted and validated for European Portuguese.

After the medical appointment the latest hemoglobin A1C value and the sociodemographic data, such as age and gender of patient were registered by a doctor or nurse. Diabetes was considered controlled if HBA1c was < 7%.[12] Subsequently, the questionnaires and the informed consent form were filed in order to ensure anonymity. The clinicians were not aware of the scheduled days of the study.

Instruments

Self-care variables

Diabetes self-care behaviors were assessed using the 7-item scale version of the Summary of Diabetes Self-Care Activities (SDSCA), culturally adapted and validated for European Portuguese by Bastos *et al*.[13]

Each item (from 1 to 6) contained a score from 0 to 7 corresponding to the weekdays, and the aim of the scale was to assess the frequency of self-care activities. Self-care included general diet (healthy diet, vegetable and fruit consumption), specific diet (weekly consumption of red meat, carbohydrates, alcoholic beverages and sugar), physical exercise, blood glucose monitoring, foot care and medication adherence. Item 6 included medication adherence, with item 6.1 being related to adherence in general, 6.2 to adherence to injectable medicines and item 6.3 to oral medication.

Dimensions of SDSCA were rated from 0 to 100, with better results corresponding to higher scores. Higher scores in a specific diet dimension corresponded to a worse self-care activity. For this study, these scores were inverted in order to standardize answers. Patients chose to respond to item 6.1 or 6.2 and 6.3. Therefore, we used total number of days for item 6.1 and mean number of days if both 6.2 and 6.3 and statistics were performed separately, according to the original scale validation article.[14]

Item 7 included smoking habits in a "yes" or "no" question, followed by the questions "how many cigarettes per day" and "when did you smoke your last cigarette" if the answers were positive. Better scores on general diet, physical exercise, blood glucose monitoring, foot care and medication items revealed better self-care. Lower scores on specific food items, smoking habits and a higher number of cigarettes per day were associated with worse self-care.[1,10,14]

Patient-centered medicine

The quality of medical practice was assessed using the Patient Centered Medicine, patient version (PCMp) scale, culturally adapted and validated for European Portuguese.[15] This 9 item scale created by Moira Stewart includes the following questions: (1) Were your reasons for today's appointment discussed?, (2) Were you satisfied with the conversation about your problem(s)?, (3) Did the doctor listen to what you had to say?, (4) Did the doctor explain your problem?, (5) Did you talk about what each one should do to improve?, (6) Did the doctor explain the treatment?, (7) Did the doctor talk to you about the ease of this treatment for you?, (8) Do you feel that your doctor understands you? and (9) Has the doctor talked to you about personal or family issues that may affect your health?. The answer options were "Completely", "Partially", "A little" and "None". The options were converted in the SPPS statistical program to "0", "1", "2" and "3", with lower scores being associated with a more patient-centered medical practice.[15]

Statistical analyses

Statistical analysis was performed with SPSS, version 26. Descriptive statistics were presented as means (M) and standard deviations (SD) for quantitative variables with symmetrical distributions and frequencies (n) and percentages (%) for categorical variables. Symmetry was considered when the skewness coefficient was [-1, 1]. Linear regressions were implemented to assess linear associations with continuous outcomes, after screening for Pearson correlations. Unstandardized coefficients (β) were used to measure the effect size of the independent variables in the outcome. Residual's normality was assessed with the Shapiro Wilk test and by observing histograms. Variance's homoscedasticity was assessed by observing no trend in the plot of standardized residuals *versus* standardized predicted values. No outliers were found outside the interval [-3; 3]. Logistic regression was used to assess associations with binary outcomes. Adjusted odds ratios (aOR) were calculated to measure the effect size of the independent variables in the outcome. Multivariate regression models were implemented including significant ($p < 0.05$) and marginally significant ($p < 0.10$) independent variables for both linear and logistic regression models.

RESULTS

Sample characterization

A total sample of 298 was calculated and 298 patients with type 2 diabetes were included in the analysis. The sample, composed of 136 (45,6%) female participants, was aged between 29 and 93 years old, mean 67.40 ± 10.19. The mean value of HbA1C was 6.97 ± 1.04%, ranging from 4.4% to 10.6%. The prevalence rate of HbA1c ≥ 7% was n = 35.2% (n = 105).

SDSCA-Scale and PCMp-Questionnaire

After observing the distribution of SDSCA and PPCMP, the corresponding scores were calculated. For SDSCA the recommendations of transforming scores in [0 - 100] were followed, by using the formula: [(sum of items/max range) x 100]. The PCMp total score was calculated as the sum of all its items. Table 1 shows descriptive results for SDSCA dimensions, PCMp total score and HbA1C and Pearson correlations for all these variables. Considering the goal of studying the associations of SDSCA dimensions with PCMp, Pearson correlation was used to measure the strength between SDSCA dimensions and PCMp. Negative correlations between general diet ($r = -0.264$, $p < 0.01$), specific diet ($r = -0.408$, $p < 0.01$), exercise ($r = -0.136$, $p < 0.05$), foot care ($r = -450$, $p < 0.01$), 6.1 general medication ($r = -0.180$, $p < 0.01$) and PPCMP were found.

To assess the correlation between HbA1c and SDSCA dimensions, these results were also included in the correlation matrix. Pearson correlations between SDSCA dimensions and HbA1c detected a negative correlation between HbA1c and specific diet ($r = -0.216$, $p < 0.01$) and a positive correlation between HbA1c and blood sugar testing ($r = 0.327$, $p < 0.01$), medication in general 6.1 ($r = 0.126$, $p < 0.05$), injectable medicines 6.2 ($r = 0.206$, $p < 0.01$), oral medication 6.3 ($r = 0.157$, $p < 0.01$) and PCMp total score ($r = 0.366$, $p < 0.01$).

T-tests showed that smoking at least once in the past seven days was significantly associated with higher PCMp total score ($p = 0.048$).

After observing correlations and *T*-test results, linear regressions were performed. After Pearson correlations between SDSCA dimensions and PCMp to measure the strength of correlation were performed, we selected the associations that were statistically significant associations. Table 2 shows linear regressions for associations between SDSCA factors (DV) and PPCMP (IV) adjusted for sex and age. Significant associations were found for general diet, decreasing, on average, -0.07 for each unit of PCMp score ($\beta = -0.07$, $p < 0.001$), for specific diet, decreasing, on average, -0.10 for each unit of PCMp score ($\beta = -0.10$, $p < 0.001$), for exercise, decreasing, on average, -0.03 for each unit of PCMp score ($\beta = -0.03$, $p = 0.008$), for foot care, decreasing, on average, -0.11 for each unit of PCMp score ($\beta = -0.11$, $p < 0.001$) and for general medication 6.1, decreasing, on average, -0.06 for each unit of PPCMP score ($\beta = -0.06$, $p = 0.001$). The model with the highest quality was model 2, for specific diet, with 17.1% of specific diet variance, explained by PCMp, sex and age.

Logistic regression results for the association of smoking in the last seven days with PCMp, adjusted for sex and age showed that the chance of smoking in the last seven days increased 9% for each unit increase in PCMp score {aOR = 1.09, 95% CI= [1.03, 1.16], $p = 0.002$}.

Pearson correlations between SDSCA dimensions and HbA1c retrieved significant associations between them. Table 3 shows a multiple linear regression HbA1C (DV) association with the significant SDSCA dimensions (IVs), detected in the correlation matrix, adjusted for sex and age. Specific diet was associated with less HbA1c ($\beta = -0.01$, $p = 0.007$), blood sugar testing ($\beta = 0.01$, $p < 0.001$) and higher score in PCMp. Worse results were associated with higher HbA1C ($\beta = 0.06$, $p < 0.001$). Results as high as 25.8% of HbA1c were explained by specific diet, blood sugar testing, medication, PPCMP, sex, and age.

In this context, a logistic regression was also implemented, considering HbA1C > 7%. A significant association for blood sugar testing was found {aOR = 1.02, 95% CI= [1.01, 1.02], $p < 0.001$}, with 2% more chance of HbA1c > 7% for each unit increase in blood sugar testing and for PCMp {aOR = 1.16, 95% CI= [1.10, 1.22], $p < 0.001$}, with 15% more chance of HbA1c > 7% for each unit in PCMp.

Regressions between age and gender, with each SDSCA dimension, PCMp total score and HbA1c, to find an association between these variables, were performed. Table 4 presents associations of age and gender with each SDSCA dimension, PPCMP total score and HbA1c. Males ($\beta = -6.93$, $p = 0.007$) and older patients ($\beta = -0.42$, $p = 0.001$) were associated with a lower score for a specific diet. Males were associated with a higher score in exercise ($\beta = 7.62$, $p = 0.029$), a lower score in foot care ($\beta = -6.06$, $p = 0.029$). Male patients presented lower scores in injectable medicines 6.2 ($\beta = -0.73$, $p = 0.018$), as well as older patients ($\beta = -0.03$, $p = 0.045$). Older age was associated with higher PCMp total score ($\beta = 0.07$, $p = 0.030$).

Logistic regression results for the association of smoking in the previous seven days with sex and age showed that male patients were 2.91 times more likely to have smoked compared to women {aOR = 2.91, 95% CI= [1.27, 6.71], $p = 0.012$}, and that odds decreased 3% for each year of age {aOR = 0.97, 95% CI= [0.94, 1.00[, $p = 0.041$}.

DISCUSSION

To our knowledge, the current study is the first one to investigate the association of self-care activities and PCM practice and its influence on disease control in Portuguese patients with T2DM.

Self-care activities, involving medication adherence, blood sugar testing, foot care and diet are necessary for successful management of diabetes.[10]

Patient-centered medicine is linked to alliance, communication, health promotion and self-care care entailing better results and health outcomes.[10,16]

This convenience sample was mostly male (n = 162, 53,7%), as expected, according to Portuguese National Health Service data.[17]

The prevalence rate of HbA1c ≥ 7%, patients with uncontrolled T2DM, was 35.2% (n = 105).

After Pearson correlations between SDSCA dimensions and PCMp, significant associations were found for general diet, specific diet, exercise and foot care to PCMp, adjusted for sex and age. Therefore, a better patient-centred medical practice, is likely to increase exercise levels and promote a better general and specific diet, foot care and medication adherence.

According to Williams et al, patients with T2DM consider PCM as an important factor for self-management, and that is significantly associated with better self-care behaviors.[10] Additionally, to Devoe et al, effective doctor-patient communication favors interactions and has a significant impact on patient behaviors and health outcomes.[18]

A significant association of smoking in the last seven days with PCMp, adjusted for sex and age showed that higher values on the PCMp scale were associated with a greater probability of smoking.

PCMp elements may be applied to patient-centered tobacco management. Therefore, according to Gould et al,[19] maintaining a long-standing doctor-patient relationship enables the adoption of solutions and goals that favor an eventual smoking cessation.

Specific dietary scores were rated from 0 - 100, with the remaining dimensions of SDSCA. Therefore, better scores corresponded to higher scores, closer to 100. Regarding medication adherence, one of the topics was "On how many of the last seven days did you take your recommended diabetes medication?"; related to item 6.1, another topic was "On how many of the last seven days did you take your recommended insulin injections?" and item 6.3 asked "On how many of the last SEVEN DAYS did you take your recommended number of diabetes pills?". Patients chose to respond to item 6.1, or 6.2 and 6.3. Therefore, we used total number of days for item 6.1 and used mean number of days if both 6.2 and 6.3. Statistics were performed separately, according to the original scale validation article.[14]

After Pearson correlations between SDSCA dimensions and HbA1c were performed to measure the strength of correlation, an association was found between HbA1c (DV) and the significant SDSCA dimensions (IVs), adjusted for sex and age, showing that better levels of HbA1c were associated with a better specific diet.

Better diabetes self-care behaviors were related with a better glycemic control, which concurs with the findings of Amer et al.[20] To Silva-Tinoco et al, self-care activities mediate the influence of diabetes knowledge on glycemic control.[1]

Lower scores in blood sugar testing were associated with lower HbA1c. Self-monitoring in type 2 diabetes is currently not recommended, as the scale is outdated.[20] Therefore, these results are not suitable for analysis. We can also assume that the patients who follow the recommendations are more likely to have a controlled disease.

Worse scores in PCMp and not having had a PCM consultation were associated with higher HbA1C. Studies have shown an improvement in glycemic control of type 2 diabetes by PCM,[10,21] but other studies could not find such results after adjusting for appropriate confounders.[10]

Slingerland et al suggested that PCM is not effective for patients with a baseline HbA1c < 7% but provides value for patients with type 2 diabetes with a baseline HbA1C > 8.5%, which may justify its implementation.[22]

Regressions between age and gender with each SDSCA dimensions, PCMp total score and HbA1c revealed that male and older patients presented worse specific dietary scores. A review article showed that men were less likely to attend medical appointments, to perform preventive care and were more likely to be overweight when compared to women.[23] Women tended to have more health care responsibilities than men.[24]

In this study, males were shown to exercise more receive foot care less often. However, previous research demonstrated that women reported having significantly better exercise habits than men.[25]

Males and elderly patients showed worse adherence to injected medication (item 6.2), and older patients presented worse PCMp total scores. The explanation for age-related differences in health care communication is ambiguous. Prior studies suggested that the communication of healthcare providers with older patients is less effective. Healthcare providers may be more tolerant with the inadequacies of older people, and it has been found that the satisfaction levels of elderly patients rise between 65 to 80 years and then decrease.[26]

In this study, male patients had a higher prevalence rate of smoking habits and older patients presented a lower prevalence rate, which is in line with previous results.[23]

This study has some limitations. The present results have limited geographic coverage, even though it was representative of the studied population; and its quality of an observational cross-sectional study.

Moreover, the SDSCA scale was outdated in the item referring to glucose self-measurement, since it is no longer recommended, and the self-reported data may bias the present results. Social desirability response and memory are biases to be considered. The exclusion criteria – severe diabetic retinopathy – may have resulted in a selection bias to the study, excluding patients with severe disease.

Larger studies covering other regions and districts of Portugal will allow a better picture and probably better health outcomes. Future studies should investigate what parameters influence diabetes evolution and control.

CONCLUSION

The Summary of Diabetes Self-Care Activities scale showed that the practice of patient-centered medicine was associated with better self-care behaviors in T2DM2 patients, particularly for general diet, specific diet, exercise and foot care.

Patient-centered medicine and self-care activities, especially specific diet, can lead to a better glycemic control.

There were differences in self-care behaviors between gender and age in PCMp scores, with male and older patients having worse ratings. No significant gender and age differences in HA1c levels were found.

The importance of the family physician's role in self-care of type 2 diabetes patients must be further investigated.

AUTHOR CONTRIBUTIONS

SS, LMS: Conception of the work, data collection and analysis, writing and approval of the manuscript.

AMP: Conception of the work, writing and approval of the manuscript.

PROTECTION OF HUMANS AND ANIMALS

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association updated in 2013.

DATA CONFIDENTIALITY

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

COMPETING INTERESTS

The authors have declared that no competing interests exist.

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Table 1 – Descriptive statistics and matrix correlations of the measures in this study

SDSCA	Range	M (SD)	Correlations									
			1	2	3	4	5	6.1	6.2	6.3	7	8
1. General diet	[0 - 100]	64.08 (21.93)	1	0.055	0.307**	0.273**	0.264**	0.227**	0.104	0.200**	-0.264**	-0.061
2. Specific diet	[0 - 100]	58.48 (22.52)		1	0.113	0.104	0.204**	0.097	0.195**	0.059	-0.408**	-0.216**
3. Exercise	[0 - 100]	32.17 (30.06)			1	0.184**	0.235**	0.169**	0.033	0.172**	-0.136*	0.106
4. BS testing	[0 - 100]	33.92 (32.31)				1	0.145*	0.161**	0.390**	0.125*	0.070	0.327**
5. Foot care	[0 - 100]	83.00 (23.85)					1	0.349**	-0.054	0.196**	-0.450**	-0.041
6.1 Medication	[0 - 7]	6.41 (1.76)						1	0.134*	0.713**	-0.180**	0.126*
6.2 Medication	[0 - 7]	1.22 (2.66)							1	0.098	0.023	0.206**
6.3 Medication	[0 - 7]	5.98 (2.28)								1	-0.084	0.157**
7. PPCMP total score	[0 - 27]	4.29 (5.50)									1	0.366**
8. HbA1C	[4.4 - 10.6]	6.97 (1.04)										1

PPCMP: patient perception of patient-centeredness; BS testing: blood sugar testing
*: $p < 0.05$
**: $p < 0.01$

Table 2 – Linear regressions for SDSCA factors association with PPCMP

DV	β	SE	p-value	R²
Model 1: General diet	-0.07	0.01	$p < 0.001$	0.083
Model 2: Specific diet	-0.10	0.01	$p < 0.001$	0.171
Model 3: Exercise	-0.03	0.01	$p = 0.008$	0.030
Model 4: Foot care	-0.11	0.01	$p < 0.001$	0.214

Regressions adjusted for sex and age

Table 3 – Linear regressions for HbA1C association with SDSCA dimensions and PPCMP

IV	B	SE	*p*-value	R²
Specific diet	-0.01	≈0.00	*p* = 0.007	
BS testing	0.01	≈0.00	*p* < 0.001	
Medication 6.1	-0.01	0.04	*p* = 0.427	0.258
Medication 6.2	0.05	0.02	*p* = 0.051	
Medication 6.3	0.06	0.03	*p* = 0.138	
PPCMP	0.06	0.01	*p* < 0.001	

Regressions adjusted for sex and age; BS testing: blood sugar testing

Table 4 – Linear regressions for age and gender association with SDSCA dimensions, PPCMP total score and HbA1C

DV	Independent variables β (SE) *p*-value		R²
	Sex (male)	**Age**	
Model 1: General diet	-2.39 (2.55) *p* = 0.349	0.18 (0.13) *p* = 0.147	≈0.00
Model 2: Specific diet	**-6.93 (2.56) *p* = 0.007**	**-0.42 (0.13) *p* = 0.001**	0.049
Model 3: Exercise	**7.62 (3.47) *p* = 0.029**	0.32 (0.17) *p* = 0.063	0.019
Model 4: BS testing	-3.91 (3.77) *p* = 0.301	-0.02 (0.19) *p* = 0.920	≈0.00
Model 5: Foot care	**-6.06 (2.77) *p* = 0.029**	0.03 (0.14) *p* = 0.854	0.010
Model 6.1: Medication	-0.16 (0.21) *p* = 0.433	0.14 (0.01) *p* = 0.159	≈0.00
Model 6.2: Medication	**-0.73 (0.31) *p* = 0.018**	**-0.03 (0.02) *p* = 0.045**	0.023
Model 6.3: Medication	0.12 (0.27) *p* = 0.654	0.01 (0.01) *p* = 0.420	≈0.00
Model 7: PPCMP total score	0.22 (0.64) *p* = 0.734	**0.07 (0.03) *p* = 0.030**	0.010
Model 8: HbA1C	-0.09 (0.12) *p* = 0.455	0.01 (0.01) *p* = 0.120	≈0.00

PPCMP: patient perception of patient-centeredness; BS testing: blood sugar testing