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Validity of the Community Integration Questionnaire as a Measure of Participation in Persons with Diabetes Mellitus

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Abstract

Objective: The purpose of this study was to examine the validity of using the Community Integration Questionnaire (CIQ) with people with Diabetes Mellitus (DM). The CIQ measures levels of participation and frequency of engagement in activities.

Methods: A convenience sample of 97 women participated in the study in three groups (DM=32; Rheumatoid Arthritis (RA)=29; Healthy Controls=36). Participants completed a demographic questionnaire, Keitel Functional Test, the Health Assessment Questionnaire (HAQ), the Dartmouth Primary Care Cooperative Information Project (COOP), and the CIQ.

Results: The groups were similar in age, disease duration, education, and marital status. The DM group had significantly better joint motion compared to the RA group. For all CIQ domains and the CIQ Total, the scores of the DM group were each significantly higher than the RA group and similar to the HC group. A similar trend was found for the other measures of participation, the HAQ and COOP Total. In the DM group, the correlations between the CIQ Social, CIQ Productivity, CIQ Total and the HAQ and COOP were moderate to good. There were no significant correlations between the CIQ Home and the HAQ and COOP Total.

Conclusion: The findings provide partial support for known-groups validity of the CIQ as there were significant differences in CIQ scores between individuals with DM and RA, two very different chronic diseases. However, there were no differences between the DM and HC groups. Concurrent validity in people with DM was established by the correlations between the CIQ Social, CIQ Productivity, and CIQ Total and the HAQ and COOP with people with DM. However, larger studies are needed to support these findings.

Keywords: Diabetes; Community integration questionnaire; Activity limitations; Participation

Introduction

Diabetes Mellitus (DM) is a chronic metabolic disease caused by insufficient amounts of insulin, in relative or absolute quantities. The prevalence of diabetes worldwide was estimated to be approximately 285 million adults in 2010 and expected to increase by 20% in developed countries and 69% in developing countries [1].

DM is a major cause of heart disease and stroke; and is the leading cause of kidney failure, non-traumatic lower limb amputations, and new cases of blindness [2]. In addition to body structure and function impairments, adults with DM also have an increased risk for activity and participation limitations in the areas of mobility, activities of daily living (ADLs), and instrumental activities of daily living (IADLs) [3-5]. Egede [6] examined the prevalence of specific activity limitations in individuals with DM and found the following: 44% had difficulty stooping, bending or kneeling; 40% had difficulty standing on their feet for two hours; 39% had difficulty walking 12 city blocks, 32.2% had difficulty pushing or pulling heavy objects; 30.7% had difficulty climbing 10 steps; 25.4% had difficulty lifting ten pounds; 20.5% had

difficulty shopping; 18.9% had difficulty grasping small objects; and 17% had difficulty both sitting for two hours and reaching overhead.

Mobility limitations, such as decreased gait speed, standing balance, and leg strength are also common in people with DM; older individuals with DM were also more likely to use a mobility aid compared to older individuals without DM [3]. Other activity limitations due to DM include loss of muscle strength, particularly hand grip strength and dexterity [5,7-9]. Decreased pinch, grip strength and dexterity and sensation greatly affect the ability to do various diagnostic and therapeutic procedures necessary for management of DM [8].

Environmental factors such as family, health professionals and health services are important for control of glycemic levels for people with DM. Social support from family, friends, and healthcare providers has been associated with better health outcomes in relation to quality of life and DM self-care behaviors [10]. People with DM may have participation limitations; however, their friends and family may have an important role in assisting the person with DM to participate in school, work, performing ADLs, and mobility.

The body structures, functional impairments, and activity limitations in DM are well studied. However, the participation category

of the International Classification of Function has received little attention which is problematic given that engagement in meaningful activities is associated with better quality of life for people with DM. Many questionnaires used with people with DM contained very few questions about participation and social engagement [11].

The Community Integration Questionnaire (CIQ) is a commonly used instrument which measures levels of participation and frequency of engagement in activities. The CIQ is composed of three domains: Home Integration, Social Integration, and Productive Activities [12]. The CIQ has been used with people with a variety of conditions [12-15].

Thus, the purpose of the present study was to examine the validity of the CIQ in people with DM. Concurrent validity was investigated by comparing CIQ scores to scores on other instruments which measure activity and participation. Known-groups validity was studied by comparing CIQ scores of individuals with DM, individuals with Rheumatoid Arthritis (RA), and a healthy control (HC) group. The HC and RA groups were chosen for comparison as it would be expected that these populations would have different levels of participation compared to people with DM [16,17].

Methods

Participants

Ninety-seven women participated in this study: 32 women with DM, 29 women with RA, and 36 HC women without chronic conditions. Participants in this study were part of a larger study on quality of life in adults with DM and RA. All participants were included in the study if they were a female between the ages of 18 and 75 years old. Participants with DM must have been diagnosed for a minimum of 1 year. Participants were excluded if they had a disability attributable to another medical condition such as stroke or blindness. Participants in the RA group had to have been diagnosed by a rheumatologist as having RA for at least 1 year. A convenience sample of participants in the HC group were included if they had no self-reported chronic conditions. This study was approved by the university institutional review board. Participants were recruited by word of mouth as well as posted advertisements in local hospitals and community centers.

Procedure

A cross-sectional design was used in which participants were tested at one point in time. After informed consent was obtained, the questionnaires described below were administered to each participant. Data collection took approximately one hour and participants were compensated for their time.

Measures

Demographic information was collected regarding age, disease duration, marital status, education level, pain [1 (severe pain) to 5 (no pain)], and joint mobility (Keitel Functional Test). Other measures are described below.

Keitel functional test (KFT)

Joint motion was measured using the KFT [18,19]. The KFT consists of 24 performance tasks that evaluate functional joint motion, where separate scores are obtained for the right and left upper extremities and lower extremities. A total score is determined by summing the scores on all tasks for upper and lower extremities. A higher score indicates more joint mobility limitations; whereas a lower score indicates less joint mobility limitations. Inter-observer agreement was reported to be 0.85 and test-retest reliability, 0.96 [19].

Community integration questionnaire

As stated above, the CIQ assesses level of independence and frequency of participation in activities in three domains: Home Integration, Social Integration, and Productive Activity. Responses to the majority of items in the Home Integration and Social Integration domains are scored based on whether items are performed alone or with others and how often the item is performed [12].

The Productive Activity items are scored based on whether people are working, going to school or volunteering. Overall scores, which represent a summation of the scores from the 15 items, can range from 0 to 29. A higher score indicates more participation and engagement in activities, and a lower score indicates less participation and engagement in activities. Test –retest reliability was reported to range from .83 to .96 [12,14,20].

Health assessment questionnaire (HAQ)

The disability scale on the HAQ was used as one comparative measure as it is widely used as a measure of participation and activity limitations [21]. The HAQ disability scale consists of eight categories of daily living activities (dressing and grooming, arising, eating, walking, hygiene, reach, grip, and outside activity). Each question is scored from 0 (no difficulty) to 3 (unable to do). The highest score for any component question in each category determines the score for that category. Adding the scores for each of the categories and dividing by the number of categories answered, yields a disability index. A higher score indicates more activity and participation limitations. Test-retest reliability for the total disability scale was reported to be 0.98 [21].

The dartmouth primary care cooperative information project (COOP)

The COOP chart system was used as a second comparative measure as it also examines aspects of participation and activity limitations in persons with chronic diseases [22]. The COOP chart has pain, feelings, and overall health. Items are rated on a 5-point scale from 1 (great difficulty) to 5 (no difficulty). A lower score indicates a poor level of health and role performance. Inter-rater reliability for the COOP charts showed a Kappa coefficient of 0.76 or higher [23].

Data analysis

Data was analyzed using the SPSS software version 19.0. Means and standard deviations were calculated for age, disease duration, and pain. Chi square analyses were used to compare groups on marital status, and education level.

A one-way ANOVA was used to compare mean scores of the DM group to the RA and HC groups on Keitel UE, Keitel LE, Ketial Total, HAQ, COOP Total, CIQ Home, CIQ Social, CIQ Productivity, and CIQ Total. Post hoc Tukey's tests were performed as needed. Spearman Rho correlation coefficients were calculated to determine relationships between the CIQ, HAQ, and the COOP.

Results

Table 1 provides demographic information of the participants. There were no significant differences between the three groups for age, disease duration, marital status, or education level. Both groups had significantly more pain compared to the HC group (DM p<0.05; RA p<0.001) but the group with DM had significantly less pain than the RA group (p<0.05). For the Keitel UE, Keitel LE, and Keitel Total, mean scores for the DM group were significantly lower (less joint limitations) than the RA group (p<0.001), but were similar to the HC group.

Demographic values	DM (n=32)	RA (n=29)	HC (n=36)	p-value
M age in years ± SD	50.6 ± 11.5	46.2 ± 14.5	45.3 ± 14.6	0.25
Disease duration in years ± SD	8.7 ± 9.0	9.4 ± 9.1	0.0 ± 0.0	0.06
Marital Status				0.6
% married	50	40.3	38.9	
% not married	50	51.7	61.1	
Education level				
%High School or Less	56.3	41.2	36.1	0.2
%More than High School	43.8	58.8	63.9	
Pain	3.4 ± 1.0	2.6 ± 1.1	4.1 ± 0.9	< 0.001
Keitel UE	5.9 ± 2.6	11.2 ± 7.5	4.5 ± 1.7	< 0.001
Keitel LE	3.6 ± 3.9	7.7 ± 8.6	1.2 ± 1.2	< 0.001
Keitel Total	9.5 ± 5.9	18.9 ± 12.6	6.0 ± 1.7	< 0.001

DM = Diabetes Mellitus; RA = Rheumatoid Arthritis; HC = Healthy Control; UE =Upper Extremity; LE = Lower Extremity; SD = Standard Deviation

Table 1: Provides demographic information of the participants.

Table 2 shows the mean scores for the participation measures by disease group. A one-way ANOVA showed significant differences between groups for the HAQ, COOP Total, CIQ domains, and CIQ Total. For the HAQ, mean scores of the DM group were similar to the HC group (p<0.05) but were significantly lower than the RA group (p<0.001) indicating less disability in the DM group.

For the COOP Total, the mean scores of the DM group were significantly higher than the RA group (p<0.05); however the mean scores of the DM group were significantly lower than the HC group (p<0.05). For the CIQ Home, Social, Productivity, and Total, the mean scores of the DM group were significantly higher than the RA group (p<0.05); however the mean scores of the DM group were similar to the HC group (p>0.05). Thus, the DM and HC groups were more integrated and had more participation than the RA group.

Table 3 shows the Spearman Rho correlation between the CIQ and other measures of participation for the group with DM. The correlations between the CIQ Social, CIQ Productivity, CIQ Total to the HAQ and COOP Total were moderate to good [24]. There were no significant correlations between the CIQ Home to the HAQ and COOP Total.

	DM (n=32) M ± SD	RA (n=29) M ± SD	HC (n=36) M ± SD	P value
HAQ	0.4 ± 0.5	1.2 ± 0.7	0.1 ± 0.2	<0.001
COOP Total	21.6 ± 4.8	18.0 ± 4.7	24.8 ± 3.4	<0.001
CIQ Home	7.5 ± 2.2	6.0 ± 2.3	7.2 ± 2.2	<0.01
CIQ Social	9.9 ± 1.6	8.4 ± 2.2	10.0 ± 1.6	<0.01
CIQ Productivity	5.3 ± 1.7	4.2 ± 2.4	5.7 ± 1.4	<0.01
CIQ Total	22.7 ± 3.8	18.6 ± 5.2	22.9 ± 3.1	<0.001

DM = Diabetes Mellitus; RA = Rheumatoid Arthritis; HC = Healthy Control; M = Mean; SD = Standard Deviation; HAQ = Health Assessment Questionnaire; COOP = Dartmouth Primary Care Cooperative Information Project; CIQ = Community Integration Questionnaire

Table 2: Mean Scores of Participation Measures by Disease Group.

Table 3 shows the Spearman Rho correlation between the CIQ and other measures of participation for the group with DM. The correlations between the CIQ Social, CIQ Productivity, CIQ Total to the HAQ and COOP Total were moderate to good [24]. There were no significant correlations between the CIQ Home to the HAQ and COOP Total.

	CIQ Home	CIQ Social	CIQ Productivity	CIQ Total
HAQ	-0.20	-0.55**	-0.55**	-0.59**
COOP Total	0.26	0.68**	0.50*	0.67**

*=p<0.01 , **=p<0.001

HAQ = Health Assessment Questionnaire; COOP = Dartmouth Primary Care Cooperative Information Project; CIQ = Community Integration Questionnaire; Note: a higher score on the HAQ means more participation limitations; a higher score on the CIQ means less participation limitations

Table 3: Correlations between CIQ and other Participation Measures.

Discussion

The focus of this study was to examine the validity of the CIQ in people with DM. The findings provide partial support for known-groups validity of the CIQ as there were significant differences in CIQ scores between individuals with DM and RA, two very different chronic diseases. However, the CIQ did not differentiate between the DM and HC groups in any CIQ domain. One limitation of the study is that data on disease severity was not obtained; therefore, the DM group may have had mild DM, or well controlled blood glucose levels which did not result in significant activity and participation limitations. Furthermore, our sample did not report complications such as neuropathy, amputations, blindness, etc., which could have resulted in lower levels of community participation. However, our findings are supported by a study which did not find significant group differences in the CIQ Home and CIQ Social domains in between people with traumatic brain injury who were in different living or working situations [25].

Examining the CIQ domain scores from our sample to scores from studies with other disease conditions, our DM group means scores in all CIQ domains and CIQ Total were higher (more integrated) than the participants with aphasia, physical disability, brain injury, aphasia and burns (13,15,20,25,26] (SCI, multiple sclerosis, limb loss, muscular dystrophy), malignant brain tumor, and TBI. Thus, our DM group had less activity and participation limitations compared to other disease groups. Therefore, the severity of disease or disability, and also care and management of DM may cause an individual to have barriers to participation in activities and social engagement.

The results also help support the concurrent validity of the CIQ as the CIQ Social, CIQ Productivity, and CIQ Total showed moderate to good correlations with the HAQ and COOP. However, no significant correlations between the CIQ Home and the HAQ and COOP were found. This finding is supported by other studies on people with other chronic conditions [20,26].

Limitations and Future Research

This study has limitations which consist of a small sample size and narrow geographic area which may limit generalization of the results and clinical significance. In addition, data on disease severity was not obtained for the DM or RA groups. Furthermore, data on blood glucose levels was not obtained. Future studies could examine validity by comparing people with DM with varying degrees of body composition, disease severity and complications, all of which may affect activity and participation.

Conclusion

This study supports known-groups and concurrent validity of the CIQ. According to our results, the CIQ is an adequate instrument to assess participation and social engagement in individuals with DM.

As DM prevalence is on the rise, rehabilitation professionals will work with individuals to participate in activities of daily living and engage in activities that are meaningful to the person while addressing their hand and mobility impairments, fatigue, joint limitations, or other disabilities caused by DM [27]. Both rehabilitation and other professionals can use the CIQ to determine the person's frequency and level of participation to get a baseline of their level of participation in activities as the CIQ captures participation through the individual's perspective.

References

1. Shaw JE, Sicree RA, Zimmet PZ (2010) Global estimates of the prevalence of diabetes for 2010 and 2030. Diabetes Res Clin Pract 87: 4-14.

2. Fowler MJ (2008) Microvascular and macrovascular complications of diabetes. Clin Diabetes 26: 77-82.

3. Sinclair A, Conroy S, Bayer A (2008) Impact of diabetes on physical function in older people. Diabetes Care 31: 233-235.

4. Wong E, Backholer K, Gearon E, Harding J, Freak-Poli R, et al. (2013) Diabetes and risk of physical disability in adults: A systematic review and meta-analysis. Lancet Diabetes Endocrinol 1: 106-114.

5. Ratzon N, Futeran R, Isakov E (2010) Identifying predictors of function in people with diabetes living in the community. Br J Occup Ther 73: 277-283.

6. Egede LE (2004) Diabetes, major depression, and functional disability among U.S adults. Diabetes Care 27: 421-428.

7. Cetinus E, Buyukbese MA, Uzel M, Ekerbicer H, Karaoguz A (2005) Hand grip strength in patients with type 2 diabetes mellitus. Diabetes Res Clin Pract 70: 278-286.

8. Pfutzner A, Musholt P, Schipper C, Niemeyer M, Qvist M, et al. (2012) Self-assessment and objective determination of dexterity in patients with type 1 or type 2 diabetes mellitus. Curr Med Res Opin 28: 15-21.

9. Redmond CL, Bain GI, Laslett LL, McNeil JD (2009) Hand syndromes associated with diabetes: Impairments and obesity predict disability. J Rheumatol 36: 2766-2771.

10. Huang MF, Courtney M, Edwards H, McDowell J (2010) Factors that affect health outcomes in adults with type 2 diabetes: A cross-sectional study. Int J Nurs Stud 47: 542-549.

11. Achhab Y, Nejjari C, Chikri M, Lyoussi B (2008) Disease-specific health-related quality of life instruments among adults diabetic: A systematic review. Diabetes Res Clin Pract 80: 171-184.

12. Willer B, Ottenbacher KJ, Coad ML (1994) The Community Integration Questionnaire: A comparative examination. Am J Phys Med Rehabil 73: 103-111.

13. Hirsh A, Braden A, Craggs J, Jensen M (2011) Psychometric properties of the Community Integration Questionnaire in a heterogeneous sample of adults with physical disability. Arch Phys Med Rehabil 92: 1602-1610.

14. Dalemans RJ, De Witte LP, Beurskens AJ, Van den Heuvel WJ, Wade DT (2010) Psychometric properties of the Community Integration Questionnaire adjusted for people with aphasia. Arch Phys Med Rehabil 91: 395-399.

15. Gerrard P, Kazis L, Ryan C, Shie V, Holavanahalli R, et al. (2015) Validation of the Community Integration Questionnaire in the adult burn injury population. Quality of Life Research, Qual Life Res 24: 2651-2655.

16. Benka J, Nagyova I, Rosenberger J, Macejova Z, Lazurova I, et al. (2015) Social participation in early and established rheumatoid arthritis patients. Disabil Rehabil 38: 1172-1179.

17. Kuhlow H, Fransen J, Ewert T, Stucki G, Forster A, et al. (2010) Factors explaining limitations in activities and restrictions in participation in rheumatoid arthritis. Eur J Phys Rehab Med 46: 169-177.

18. Eberl DR, Fasching V, Rahlfs V, Schleyer I, Wolf R (1976) Repeatability and objectivity of various measurements in rheumatoid arthritis. A comparative study. Arthritis Rheum 19: 1278-1286.

19. Kalla AA, Kotze TJ, Meyers OL, Parkyn ND (1988) Clinical assessment of disease activity in rheumatoid arthritis: Evaluation of a functional test. Ann Rheum Dis 47: 773-779.

20. Zhang L, Abreu B, Gonzales V, Seale G, Masel B, et al. (2002) Comparison of the Community Integration Questionnaire, the Craig Handicap Assessment and reporting technique, and the disability rating scale in traumatic brain injury. J Head Trauma Rehabil 17: 497-509.

21. Fries JF, Spitz P, Kraines RG, Holman HR (1980) Measurement of patient outcome in arthritis. Arthritis Rheum 23: 137-145.

22. Nelson E, Wasson J, Kirk J, Keller A, Clark D, et al. (1987) Assessment of function in routine clinical practice: Description of the COOP chart method and preliminary findings. J Chronic Dis 40: 55S-69S.

23. Nelson EC, Landgraf JM, Hays RD, Wasson JH, Kirk JW (1990) The functional status of patients. How can it be measured in physicians' offices? Medical Care 28: 1111-1126.

24. Portney LG, Watkins MP (2009) Foundations of clinical research: applications to practice. Pearson: Upper Saddle River, NJ.

25. Saeki S, Okazaki T, Hachisuka K (2006) Concurrent validity of the Community Integration Questionnaire in patients with traumatic brain injury in Japan. J Rehabil Med 38: 333-335.

26. Sander AM, Fuchs KL, High WM Jr, Hall KM, Kreutzer JS, et al. (1999) The Community Integration Questionnaire revisited: An assessment of factor structure and validity. Arch Phys Med Rehabil 80: 1303-1308.

27. Gregg EW, Mangione CM, Cauley JA, Thompson TJ, Schwartz AV, et al. (2002) Diabetes and incidence of functional disability in older women. Diabetes Care 25: 61-67.