The Role of Religious Coping and Social Support on Medication Adherence and Quality of Life among the Elderly with Type 2 Diabetes

1. Introduction

Type 2 Diabetes Mellitus (T2D) is a chronic disease that threatens many elderly people especially those with risk factors, such as obesity and sedentary lifestyle [1]. It is currently at an epidemic rate worldwide, with currently more than 420 million of the world population affected by T2D, and this may increase to nearly 600 million in 2035 [2]. There were more than 20 million people over the age of 65 years having T2D in the United States, and in developing countries such as China and Malaysia where between one-third and one-fifth of the elderly have T2D [3-5]. In middle-level income countries, the leading cause of death can be attributed to uncontrolled blood glucose level for both men and women over the age of 50 years [2]. In the past two decades, there has been a growing incidence of T2D in Iran that may be due to the change of lifestyle to unhealthy types. As such, based on a recent report, more than 14% of older adults in Iran suffer from this condition [6].

There are several irreversible complications associated with T2D, such as nephropathy, retinopathy, atherosclerosis, and diabetic foot that can all negatively affect the health related quality of life (HRQoL) and increase the risk of premature mortality in such patients [1]. In addition, there have been several studies reporting that HRQoL among diabetic patients is considerably lower than the general population [7; 8]. However, good adherence to medications may prevent the patients with T2D from these complications and improve their HRQoL [9]. Indeed, medication adherence (MA) has been recognized as the most influential factor in disease management in such patients [10]. Unfortunately, at least half of the diabetic patients did not take their medications as prescribed and a considerable number of the patients changed the dosage of the hypoglycemic agents without the guidance from the clinicians [11]. This problem may be more significant among older adults because many of these people (especially those in developing countries) are illiterate with insufficient knowledge or skills of self-care for chronic diseases, such as diabetes, or are affected by several physical and mental

comorbidities that may negatively affect their abilities to manage such condition.

Overall, none or poor MA may be due to various factors, such as low level of health knowledge, insufficient communication between the patients and healthcare providers, ignoring cultural differences among the patients by the health professionals, side effects of the medications, and unawareness of the negative outcomes of non-adherence [12; 13]. However, a number of factors have also been identified that may positively impact the MA and eventually will lead to better HRQoL in the patients. These factors may have mediation roles on the MA and identifying them would be helpful for the health professionals to consider them during the practice to improve MA in the patients.

Previous studies have examined the contribution of religiosity, religious coping, and spiritual beliefs to the management of disease in patients with T2D [14; 15]. The relationship between these concepts and outcome measures such as diabetic management, coping capability, well-being, emotional stress, HRQoL, and glycemic control have been investigated, and overall positive correlations have been found [16-18]. People having religious/spiritual beliefs seem to have a better adjustment to their disease and acceptable compliance with drug therapy [17]. Moreover, they usually show a better mental health status with a lower frequency of reporting anxiety or depressive symptoms than the atheists [19].

Another factor associated with better MA and self-care behaviors among the diabetic patients is social support (SS) [20]. This factor can improve the self-efficacy and self-esteem, and provide helpful resources around the patients that may positively affect their adaptation process and disease management [21]. Several authors indicated that feeling socially supported is necessary to enable patients to believe their ability and confidence towards lifestyle change and adherence to treatment [22]. It is also revealed that patients with T2D may seek a lower level of social connections and supports than healthy people that may be disruptive to the MA [23]. In addition, for the elderly who are more dependent on family members and relatives than the

general population due to aging-related disabilities, SS should be considered as an important factor that may determine the health status among these people.

Despite the important roles of religious coping (RC) and SS on MA and HRQoL in patients with T2D, there is limited literature regarding how these factors may be associated with the health outcomes (ie. MA and HRQoL); and the potential relationships between such factors are unclear. Therefore, this study intended to investigate the relationships between the factors (RC and SS) and outcomes (MA and HRQoL) and identify the mediation effects of such variables among older adults.

2. Methods

2.1 The Participants

This study was a longitudinal study, conducted in three diabetes care centers affiliated with two medical universities and Iranian Diabetes Society in Tehran and Qazvin between the years 2015-2017. The convenience sampling was used to recruit elderly patients with T2D who attended the Outpatient Diabetic Unit of university hospitals and Iranian Diabetes Society. Inclusion criteria were: a confirmed diagnosis of T2D for at least 1 year before the study; aged 65 years or older; taking anti-diabetes medications regularly, and; agreeing to participate in the study. Patients were excluded from the study if they had a severe cognitive impairment (i.e. a score in Mini Mental State Examination (MMSE) < 19), were not able to read and speak Persian, and were not responsible for taking their medications. In total, we approached 887 elderly patients with T2D and 43 refused to participate and 51 did not meet the inclusion criteria. The study was approved by the Human Ethics Committee of Qazvin University of Medical Sciences, and all participants signed the Informed Consent Form before enrolling in the study.

2.2 Measures

2.2.1 Religiosity: Duke University Religion Index (DUREL)

This is a brief scale to assess three types of religion related activities including, 1) organizational religious activity or frequency of participation in religious events (1 item); 2) non-organizational religious activity or individual religious activities such as private praying and studying Quran (1 item), and; 3) intrinsic religiosity that consists of believing in the God/divine, impact of religious beliefs on one's attitude towards life, and transferring religion into different aspects in the life (3 items). For the organizational and non-organizational religiosity, the frequency of involvement was responded using Likert scale ranged from 1 (never) - 5/6 (multiple times a day). In the intrinsic religiosity section, there was a five-scale response that ranges from 1 (definitely not true) to 5 (definitely true). The total score for this section was from 5-27 and the score for each component was also assessed where a higher score indicates greater religiosity. The Iranian version of the DUREL was shown to have acceptable psychometric properties in a previous study (Cronbach's alpha = 0.87-0.92; test-retest reliability using the intraclass correlation coefficient [ICC] = 0.62-0.79) [24].

2.2.2 Spiritual coping strategy (SCS) scale

The SCS consists of two sections, religious coping (9 items) and non-religious coping (11 items). For the purpose of this study, we only used the religious coping section. The items included are related to issues such as attending the mosque, receiving religious programs on TV or radio, praying individually or in a group, the relationship with the God or a higher power, the trust in God, etc. For all the items, the Likert responses ranged from 0 (never used) to 3 (often used) that generated a total score ranging between 0 and 27. The higher score was, the greater use of religious coping was expected. The modified Persian version of SCS in Muslims has been found as a valid and reliable tool (Cronbach's alpha = 0.87; test-retest reliability using the weighted kappa = 0.88 [25]).

2.2.3 Multidimensional Scale of Perceived Social Support (MSPSS)

Bagherian-Sararoudi et al. established the validity and reliability of the MSPSS in Iranian

population in a previous study. This 12-item instrument was used to examine the different resources of social support, including family members, significant people in one's life, and friends, with four items in each category. All items were rated using 7-point Likert scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). The total score ranged between 12 and 84. A higher score indicates better social support from all resources. The psychometric properties of the MSPSS are satisfactory (Cronbach's alpha = 0.84 - 0.93; test-retest reliability using Pearson's r = 0.74 to 0.84 [26]).

2.2.4 Medication adherence (MA)

Medication adherence report scale with five items (MARS-5) was used to assess common non-adherent behaviors in the patients. The items were rated using a five-point Likert scale from 1 (always) to 5 (never), where a higher score indicates a better adherence. The validation of the version translated into the Persian language has been confirmed in a previous study (Pearson's r = 0.7 with a medication possession rate) [27; 28].

2.2.5 World Health Organization Quality of Life Scale Brief Version (WHOQOL-BREF)

This is a self-reporting measurement on the HRQoL that consists of 26 items and assesses 4 domains, including physical, psychological, social, and environmental aspects of the quality of life. For all the items, there were five-point responses rating from 1 to 5 with positive direction on the HRQoL. For each domain, the total score ranged from 0 (worst situation) to 100 (best situation). This questionnaire has shown adequate psychometric properties in Iranian populations (Cronbach's alpha=0.90; test-retest reliability using Spearman's rho = 0.85 to 0.92) [29].

2.2.6 Diabetes-specific quality of life questionnaire module (DMQoL)

This instrument has been developed as an exclusive diabetes specific measurement regarding the HRQoL that may also be used as a supplementary module for WHOQOL-BREF. Ten items with a response scaling from 1 (very dissatisfied) to 5 (very satisfied) were included in the

questionnaire. The satisfactory level of the treatment, weight control, physical activity, diet control, the management of diabetes related complications, glycemic control, family relationship, adaptation, the time and expenses of diabetes care were assessed. Those who obtained a higher score were considered to have better HRQoL. This instrument has previously been translated and validated in Iran (Cronbach's alpha=0.89; test-retest reliability using ICC=0.79 to 0.92) [30].

2.2.7 Mini Mental State Examination (MMSE)

To assess the cognitive function of the participants at the recruitment, the MMSE was applied. This is a brief screening test for cognitive impairment of language use and memory function. The maximum score for this scale is 30 and those with a score between 24 and 30 were considered as normal. The culturally adapted Persian version of the MMSE has been used in the current study (Spearman's rho = 0.46 with the education level and -0.77 with age; sensitivity and specificity using cutoff at 23 = 98% and 100%, respectively) [31].

2.2.8 Other measurements

Demographic information on age, gender, education level, marital status, accommodation, and smoking history was recorded. In addition, the information on any diabetes related complications, such as neuropathy and retinopathy, as well as the duration of the disease was extracted from the medical records. Body mass index and blood pressure of the participants were measured in the clinics. In addition, biochemical tests such as fasting blood glucose level, HbA1c, blood urea nitrogen, lipid profile, and eGlomerulus Filtration Rate (eGFR) were performed.

2.3 Procedure

All the patients with T2D who had been referred to the Diabetes Units to receive routine care were approached to participate in this study. In a short session with the research assistants, the study aims were described to the patients. The eligibility of the patients was then assessed by

two physicians, while the participants were asked to complete a written Informed Consent Form. Then, the baseline measurements including DUREL, SCS, MSPSS, and MMSE were performed. Twelve months later, the same patients were asked to complete the follow-up measurements including MARS, DMQoL, and WHOQOL-BREF. An overnight fasting blood sample was also taken from each participant.

2.4 Data analysis

The data was analyzed using SPSS 23.0 and AMOS 24.0 software packages. Quantitative data was expressed as mean (Standard Deviation [SD]), while categorical variables were expressed as n (%). To assess the factors associated with MA and quality of life, three models were used. In all models, the latent constructs were used to measure religiosity (i.e. three dimensions: intrinsic religiosity, organizational religious activity, and non-organizational religious activity) and MA (i.e. fasting blood glucose level, HbA1c level and MARS). Moreover, all the models were adjusted for age, gender, duration of the illness, the number of comorbidities, MMSE, and education. In the first model, the relationship between religiosity and MA were examined through religious coping and perceived social support. In the second model, diabetes-specific measurements were added to the model to further assess the relationships between MA and diabetes-specific quality of life. In the third model, a generic measurement of quality of life was replaced with the diabetes-specific measurement. The proposed models were analyzed using structural equation modeling (SEM) [32]. Furthermore, all the models included an interaction effect (i.e., RC and SS) on MA. Overall, the number of missing values was low ranging from 3.1% to 6.7%. Therefore, the missing data was estimated by a full information maximum likelihood method. Moreover, the mediating roles of RC, perceived SS, and MA were examined based on the four-step Baron and Kenny's recommendations: in the first step, dependent and independent variables were significantly related. The independent variable and the mediator were significantly related in the second step. The mediator and the dependent

variable were significantly related in the third step. In the final step, the relationship between the independent and dependent variable became non-significant (full mediation) or become weaker after the addition of mediator (partial mediation) [33].

Several indices of model fit were used: comparative fit index (CFI), Tucker–Lewis index (TLI), root mean square of error approximation (RMSEA), and standardized root mean square residual. The values higher than 0.90 for the CFI and TLI indices suggest good model fit. Regarding RMSEA and standardized root mean square residual, the values less than 0.08 indicated acceptable model fit [34-36]. To ensure that the mediating effect occurs, 5000 bootstrap resamples and the 95% bias-corrected confidence estimates were used.

3. Results

Among the 793 participants with T2D, 357 (45.0%) were females. The average age of the patients was 70.21 (± 15.10) years. The average years of education were 4.16 (± 2.11) years. The most common complication was hypertension (59.4%), followed by neuropathy (51.7%), and ischemic heart disease (38.2%). Around two thirds of the participants (n=581) lived in the city. The characteristics of the patients are demonstrated in Table 1.

In terms of model fit, the three proposed models yielded acceptable outcomes (Figures 1-3); In Model 1, the fit indices were χ^2 (df) = 140.56 (51), CFI = 0.968, TLI = 0.953, RMSEA = 0.061, and SRMR = 0.053. In model 2, the fit indices were χ^2 (df) = 63.12 (58), CFI = 0.983, TLI = 0.970, RMSEA = 0.031, and SRMR = 0.025. In the third model, the fit indices were χ^2 (df) = 145.22 (55), CFI = 0.994, TLI = 0.976, RMSEA = 0.059, and SRMR = 0.021. In terms of factor loading for the latent constructs, all manifest variables were scientifically loaded on their correspondent latent structures: intrinsic (factor loadings = 0.64 to 69), organizational (factor loadings = 0.74 to 83), and non-organizational religiosity (factor loadings = 0.41 to 57) loaded on the latent construct of religiosity; MARS-5 (factor loadings = 0.73 to 0.87), fasting blood

glucose level (factor loadings = 0.22 to 0.35), and HbA1c level (factor loadings = 0.40 to 0.43) loaded on the latent construct of MA; physical health (factor loadings = 0.54 to 69), mental health (factor loadings = 0.60 to 73), social relationships (factor loadings = 0.68 to 79), and environment (factor loading = 0.51 to 66) loaded on the latent construct of generic quality of life.

Overall, the three models sufficiently explained the variance of MA (52.2% for Model 1 and 48.0% for Models 2 and 3), diabetes-specific quality of life (59.1%), and generic quality of life (17.1%). In addition, all paths were significant between the study variables in three models except for the direct relationship between religiosity and diabetes-specific quality of life (standardized beta = -0.053, $p > 0.05$) and generic quality of life (standardized beta = 0.010, $p > 0.05$).

Table 2 shows the direct, indirect, and total effects between SEM variables. In all models RC and perceived SS partially mediated the relationships between religiosity and MA. In addtion, the interaction between RC and SS support was significantly associated with MA (standardized beta = 0.401, $p < 0.001$ for Model 1; standardized beta = 0.663, $p < 0.001$ for Model 2; standardized beta = 0.393, $p < 0.001$ for Model 3). However, the effects of religiosity on both diabetes-specific and generic quality of life were fully mediated by MA, RC and SS (Table 2).

4. Discussion

In this longitudinal study, we aimed to investigate how the religiosity may affect specific and generic quality of life and whether the mediators such as RC, SS, and MA may mediate the effects of religiosity on HRQoL. We found that the impact of religiosity on quality of life is significantly mediated by our predicted factors (RC, SS, and MA) and the direct effect of religiosity on the HRQol can be considered as fiddling. Therefore, all our hypothesized models were consistent with the literature that addressed the roles of RC, SS, and MA on the quality

of life. We discovered the new paths to explain their roles by religiosity. Additionally, our results demonstrated that compared with fasting blood glucose level (factor loadings = 0.22 to 0.35), HbA1c (factor loadings = 0.40 to 0.43) serves as a stronger biomarker to determine the MA for elderly people with T2D.

There are several mediation studies that attempted to investigate the potential factors affecting the quality of life in diabetic patients. Sugiyama et al. examined the effect of a self-management empowerment intervention on the mental health aspect of the HRQoL in African American and Latinos with T2D [37]. They aimed to investigate whether this intervention has a direct effect independent of glycemic control, SS, and perceived empowerment on the generic quality of life (assessed by SF-12). In their causal mediation analysis, the program indicated a direct effect on the HRQoL and all the hypothesized factors (i.e., HbA1c, SS, and perceived empowerment) did not show any indirect effects. In another study, sleep quality was considered as the mediator between depression and anxiety symptoms and HRQoL in 86 veterans with diabetes. In this study, the mediation effect of sleep quality was confirmed and there were significant indirect effects between psychological distress and quality of life for the patients with T2D. The relationship between the fear of hypoglycemia and psychological well-being using the mediation effect of specific HRQoL has also been investigated, where significant indirect effects were found [38]. However, here we found that other significant factors, such as MA, SS, and religiosity may also be associated with the quality of life, which have been scarcely studied previously.

In a systematic review, Jaam et al. assessed the variables associated with MA among diabetic patients in two culturally similar regions (i.e., Middle East and North Africa). They found religiosity related factors to be associated with MA in several studies. In addition, they found good social interactions may help with better adherence among the patients. They concluded that cultural components may be considered when designing interventions to improve drug

adherence in this population [13]. In a study performed in Iranian patients with T2D, the relationship between the HRQoL and spiritual well-being was assessed. A positive association between the components of the HRQoL and spirituality was found, and those with higher levels of spiritual well-being showed better quality of life [16]. These studies are consistent with our findings in this study which showed significant correlation between religious beliefs and quality of life. However, we also investigated novel factors through which the religiosity may affect the HRQoL. Indeed, we identified that the impact of religiosity was mediated by factors, such as RC and SS, both of which are part of religious practice. In other words, religiosity is a broad concept which exerts its effect to improve MA and HRQoL via its components including RC and SS.

However, it needs to be noted that RC and SS are two context-based variables and may have different interactions with MA and HRQol in other cultural and religious settings. For example, in a systematic review on the factors influencing MA among patients with T2D who were mainly from the religions other than Islam, Peeters et al. did not report any association between religion related components and MA [12]. In the Islamic doctrine, high importance and value are placed on the health, and any action to threaten good health is criticized. As such, non-adherence to medication is not accepted by the culture and the patients need to try their best to restore their health. Additionally, in Islamic religion, there is a strong emphasis on helping those who are in need, forlorn or disabled. Therefore, when Muslim people are sick, they expect their important others, such as parents, offspring, relatives and friends to support them. The important role of social support in MA has been confirmed in several studies on patients with T2D in other cultures as well, thus is not strictly religion or culture dependent [20; 39].

The current study still had a number of limitations. Firstly, our study was a follow up study without any intervention to investigate the causal mediation effects. According to the hypothesized models, these mediations may exist; thus, randomized controlled trials are needed

in future studies to confirm these models. Secondly, as mentioned earlier SS and RC are context-based. Therefore, our findings may not apply well to people from other cultures or ethnic groups. However, there is some evidence indicating that SS and RC may affect the variables such as MA and quality of life (as measured in this study) in older people with chronic diseases [40-43]. Furthermore, as we have found, the interaction between RC and social SS has been recognized in previous studies [44; 45]. Thirdly, there may be other factors associated with religiosity, such as the locus of control, spiritual coping, and self-efficacy that we could not assess here, including of which may improve our models to better explain the potential mediators. Finally, we used a convenient sampling method to recruit participants from those who were referred to the Diabetes Care Centers. In future studies, the patients with T2D who don't receive care from these centers also need to be included for different study variables.

Conclusion

Religiosity shows both direct and indirect effects on MA. However, the effect of religiosity on generic and specific HRQoL is mediated through MA, religious coping, and social support. Given the strong associations between religious coping and social support with MA, using programs to improve MA via developing religious coping skills and promoting social support may be effective to increase MA among diabetic patients. Future studies of this type need to be carried out in patients in other culture and religious background to investigate the broader application of our theory.

Compliance with ethical standards

Conflict of interest

The authors declare that they have no conflict of interest.

Ethical approval

The study was approved by the by the Ethics Committee of the Qazvin University of Medical

Sciences. All procedures involving human participants were in accordance with the ethical standards of the institutional and/or national research ethics committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

References

1. Hawthorne, G. (2012). Diabetes care for the older patient : a practical handbook. London: Springer.
2. World Health Organization. (2016). Global Reports on Diabetes (2016 ed.). Geneva: WHO.
3. Deshpande, A. D., Harris-Hayes, M., & Schootman, M. (2008). Epidemiology of diabetes and diabetes-related complications. Phys Ther, 88(11), 1254-1264.
4. Gao, Y., Xiao, Y., Miao, R., Zhao, J., Cui, M., Huang, G., & Fei, M. (2016). The prevalence of mild cognitive impairment with type 2 diabetes mellitus among elderly people in China: A cross-sectional study. Arch Gerontol Geriatr, 62, 138-142.
5. Ho, B. K., Jasvindar, K., Gurpreet, K., Ambigga, D., Suthahar, A., Cheong, S. M., & Lim, K. H. (2014). Prevalence, awareness, treatment and control of diabetes mellitus among the elderly: The 2011 National Health and Morbidity Survey, Malaysia. Malays Fam Physician, 9(3), 12-19.
6. Rashedi, V., Asadi-Lari, M., Delbari, A., Fadayevatan, R., Borhaninejad, V., & Foroughan, M. (2017). Prevalence of diabetes type 2 in older adults: Findings from a large population-based survey in Tehran, Iran (Urban HEART-2). Diabetes Metab Syndr, 11 Suppl 1, S347-S350.
7. Golicki, D., Dudzinska, M., Zwolak, A., & Tarach, J. S. (2015). Quality of life in patients with type 2 diabetes in Poland - comparison with the general population using the EQ-5D questionnaire. Adv Clin Exp Med, 24(1), 139-146.
8. Landman, G. W., van Hateren, K. J., Kleefstra, N., Groenier, K. H., Gans, R. O., & Bilo, H. J. (2010). Health-related quality of life and mortality in a general and elderly population of patients with type 2 diabetes (ZODIAC-18). Diabetes Care, 33(11), 2378-2382.
9. Alfian, S. D., Sukandar, H., Lestari, K., & Abdulah, R. (2016). Medication Adherence Contributes to an Improved Quality of Life in Type 2 Diabetes Mellitus Patients: A Cross-Sectional Study. Diabetes Therapy, 7(4), 755-764.
10. Chew, B. H. (2015). Medication adherence on quality of life among adults with type 2 diabetes mellitus: an exploratory analysis on the EDDMQoL study. Quality of Life Research, 24(11), 2723-2731.
11. Saleh, F., Mumu, S. J., Ara, F., Hafez, M. A., & Ali, L. (2014). Non-adherence to self-care practices & medication and health related quality of life among patients with type 2 diabetes: a cross-sectional study. Bmc Public Health, 14.
12. Peeters, B., Van Tongelen, I., Boussery, K., Mehuys, E., Remon, J. P., & Willems, S. (2011). Factors associated with medication adherence to oral hypoglycaemic agents in different ethnic groups suffering from Type 2 diabetes: a systematic literature review and suggestions for further research. Diabetic Medicine, 28(3), 262-275.

13. Jaam, M., Ibrahim, M. I. M., Kheir, N., & Awaisu, A. (2017). Factors associated with medication adherence among patients with diabetes in the Middle East and North Africa region: A systematic mixed studies review. Diabetes Research and Clinical Practice, 129, 1-15.
14. Rivera-Hernandez, M. (2013). Religiosity, Social Support, Self-Management and Health in Older Mexicans Diagnosed with Diabetes. Gerontologist, 53, 284-284.
15. Casarez, R. L. P., Engebretson, J. C., & Ostwald, S. K. (2010). Spiritual Practices in Self-management of Diabetes in African Americans. Holistic Nursing Practice, 24(4), 227-237.
16. Jafari, N., Farajzadegan, Z., Loghmani, A., Majlesi, M., & Jafari, N. (2014). Spiritual Well-Being and Quality of Life of Iranian Adults with Type 2 Diabetes. Diabetes, 63, A203-A203.
17. Watkins, Y. J., Quinn, L. T., Ruggiero, L., Quinn, M. T., & Choi, Y. K. (2013). Spiritual and Religious Beliefs and Practices and Social Support's Relationship to Diabetes Self-Care Activities in African Americans. Diabetes Educator, 39(2), 231-239.
18. Newlin, K., Melkus, G. D., Peyrot, M., Koenig, H. G., Allard, E., & Chyun, D. (2010). Coping as a Mediator in the Relationships of Spiritual Well-Being to Mental Health in Black Women with Type 2 Diabetes. International Journal of Psychiatry in Medicine, 40(4), 439-459.
19. Kiani, F., & Hesabi, N. (2017). The Relationship Between the Religious Beliefs of the Diabetic Patients and Depression in a Diabetes Clinic in Iran. Journal of Religion & Health, 56(4), 1311-1316.
20. Gu, L., Wu, S., Zhao, S., Zhou, H., Zhang, S., Gao, M., Qu, Z., Zhang, W., & Tian, D. (2017). Association of Social Support and Medication Adherence in Chinese Patients with Type 2 Diabetes Mellitus. Int J Environ Res Public Health, 14(12).
21. Westaway, M. S., Seager, J. R., Rheeder, P., & Van Zyl, D. G. (2005). The effects of social support on health, well-being and management of diabetes mellitus: a black South African perspective. Ethn Health, 10(1), 73-89.
22. Stopford, R., Winkley, K., & Ismail, K. (2013). Social support and glycemic control in type 2 diabetes: a systematic review of observational studies. Patient Educ Couns, 93(3), 549-558.
23. Goetz, K., Szecsenyi, J., Campbell, S., Rosemann, T., Rueter, G., Raum, E., Brenner, H., & Miksch, A. (2012). The importance of social support for people with type 2 diabetes - a qualitative study with general practitioners, practice nurses and patients. Psychosoc Med, 9, Doc02.
24. Saffari, M., Zeidi, I. M., Pakpour, A. H., & Koenig, H. G. (2013). Psychometric properties of the Persian version of the Duke University Religion Index (DUREL): a study on Muslims. J Relig Health, 52(2), 631-641.

25. Saffari, M., Koenig, H. G., Ghanizadeh, G., Pakpour, A. H., & Baldacchino, D. R. (2014). Psychometric properties of the Persian spiritual coping strategies scale in hemodialysis patients. J Relig Health, 53(4), 1025-1035.
26. Bagherian-Sararoudi, R., Hajian, A., Ehsan, H. B., Sarafraz, M. R., & Zimet, G. D. (2013). Psychometric properties of the persian version of the multidimensional scale of perceived social support in iran. Int J Prev Med, 4(11), 1277-1281.
27. Lin, C. Y., Saffari, M., Koenig, H. G., & Pakpour, A. H. (2018). Effects of religiosity and religious coping on medication adherence and quality of life among people with epilepsy. Epilepsy Behav, 78, 45-51.
28. Lin, C. Y., Ou, H. T., Nikoobakht, M., Brostrom, A., Arestedt, K., & Pakpour, A. H. (2018). Validation of the 5-Item Medication Adherence Report Scale in Older Stroke Patients in Iran. J Cardiovasc Nurs, 33(6), 536-543.
29. Jahanlou, A. S., & Karami, N. A. (2011). WHO quality of life-BREF 26 questionnaire: reliability and validity of the Persian version and compare it with Iranian diabetics quality of life questionnaire in diabetic patients. Prim Care Diabetes, 5(2), 103-107.
30. Saffari M, Lin CY, O'Garo K, Koenig H.G, Sanaeinasab H, & Pakpour, A. H. (2018). Psychometric Properties of Persian Diabetes-Mellitus Specific Quality of Life (DMQoL) Questionnaire in a Population-based Sample of Iranians. International Journal of Diabetes in Developing Countries, accepted article.
31. Ansari, N. N., Naghdi, S., Hasson, S., Valizadeh, L., & Jalaie, S. (2010). Validation of a Mini-Mental State Examination (MMSE) for the Persian population: a pilot study. Appl Neuropsychol, 17(3), 190-195.
32. Hox J.J, & Bechger T.M. (1998). An introduction to struchtural equation modeling. Family Science Review, 11, 354-373.
33. Baron, R. M., & Kenny, D. A. (1986). The Moderator Mediator Variable Distinction in Social Psychological-Research - Conceptual, Strategic, and Statistical Considerations. Journal of Personality and Social Psychology, 51(6), 1173-1182.
34. Cheng, C. P., Luh, W. M., Yang, A. L., Su, C. T., & Lin, C. Y. (2016). Agreement of Children and Parents Scores on Chinese Version of Pediatric Quality of Life Inventory Version 4.0: Further Psychometric Development. Applied Research in Quality of Life, 11(3), 891-906.
35. Tsai, M. C., Strong, C., & Lin, C. Y. (2015). Effects of pubertal timing on deviant behaviors in Taiwan: A longitudinal analysis of 7th-to 12th-grade adolescents. Journal of Adolescence, 42, 87-97.
36. Wu, T. H., Chang, C. C., Chen, C. Y., Wang, J. D., & Lin, Y. (2015). Further Psychometric Evaluation of the SelfStigma Scale-Short: Measurement Invariance across Mental Illness and Gender. Plos One, 10(2).
37. Sugiyama, T., Steers, W. N., Wenger, N. S., Duru, O. K., & Mangione, C. M. (2015). Effect

of a community-based diabetes self-management empowerment program on mental health-related quality of life: a causal mediation analysis from a randomized controlled trial. BMC Health Serv Res, 15, 115.

38. Seligowski, A. V., Kaiser, A. P. P., Niles, B. L., Mori, D. L., King, L. A., & King, D. W. (2013). Sleep Quality as a Potential Mediator Between Psychological Distress and Diabetes Quality of Life in Veterans With Type 2 Diabetes. Journal of Clinical Psychology, 69(10), 1121-1131.
39. Kim, C. J., Schlenk, E. A., Kim, D. J., Kim, M., Erlen, J. A., & Kim, S. E. (2015). The role of social support on the relationship of depressive symptoms to medication adherence and self-care activities in adults with type 2 diabetes. J Adv Nurs, 71(9), 2164-2175.
40. Mendoza-Nunez, V. M., Flores-Bello, C., Correa-Munoz, E., Retana, U. G. R., & Ruiz-Ramos, M. (2016). Relationship between social support networks and diabetes control and its impact on the quality of life in older community-dwelling Mexicans. Nutr Hosp, 33(6), 1312-1316.
41. Kong, L. N., Hu, P., Yao, Y., & Zhao, Q. H. (2018). Social support as a mediator between depression and quality of life in Chinese community-dwelling older adults with chronic disease. Geriatr Nurs.
42. Warner, L. M., Schuz, B., Aiken, L., Ziegelmann, J. P., Wurm, S., Tesch-Romer, C., & Schwarzer, R. (2013). Interactive effects of social support and social conflict on medication adherence in multimorbid older adults. Soc Sci Med, 87, 23-30.
43. Vitorino, L. M., Low, G., & Vianna, L. A. C. (2016). Linking Spiritual and Religious Coping With the Quality of Life of Community-Dwelling Older Adults and Nursing Home Residents. Gerontol Geriatr Med, 2, 2333721416658140.
44. Rushing, N. C., Corsentino, E., Hames, J. L., Sachs-Ericsson, N., & Steffens, D. C. (2013). The relationship of religious involvement indicators and social support to current and past suicidality among depressed older adults. Aging Ment Health, 17(3), 366-374.
45. Brewer, G., Robinson, S., Sumra, A., Tatsi, E., & Gire, N. (2015). The Influence of Religious Coping and Religious Social Support on Health Behaviour, Health Status and Health Attitudes in a British Christian Sample. J Relig Health, 54(6), 2225-2234.