Research report

Utility of the Ability to Recognize and Respond to Family Support (ARRF) in glycemic control for men with type 2 diabetes

Tomomi Horiguchi, Michiko Inagaki, Yuya Asada

Faculty of Health Sciences, Institute of Medical Pharmaceutical and Health Sciences, Kanazawa University

Abstract

Purpose: To investigate the utility of the Ability to Recognize and Respond to Family support (ARRF) for glycemic control in men with type 2 diabetes mellitus (T2DM).

Methods: In this cross-sectional study, a self-administered questionnaire was conducted among male patients with T2DM. Participants completed questionnaires on ARRF, self-care and family size. Data on patient characteristics and glycemic control (HbA1c) were extracted from their medical records. Patients were divided into two groups based on HbA1c levels: good (HbA1c < 7 %) and poor (HbA1c ≥ 7 %) glycemic control groups.

Results: Of the 93 patients enrolled in this study, 48 were included in the good glycemic and 45 in the poor glycemic control group. ARRF and self-care correlated positively in both groups. ARRF and HbA1c correlated negatively in the good, but not in the poor glycemic control group. Multivariate regression analysis with HbA1c as the dependent variable showed that the coefficient of determination (R^2) for T2DM history and BMI in the good group was 0.13 ($p = 0.03$). However, when ARRF was added, the R^2 increased to 0.31 ($p < 0.01$).

Conclusions: ARRF is useful for good glycemic control in men with T2DM.

Introduction

The general goals of the treatment of type 2 diabetes mellitus (T2DM) are prevention or delay of the onset of diabetic complications and maintenance of a good quality of life [1]. Self-care measures to achieve good glycemic control are important for preventing diabetic complica-

tions [2][3]. However, the level of adherence to diabetes self-care differs among patients, indicating that the decision-making processes for self-care are influenced by various factors [4]. One of these factors is family support.

Family support is an essential element of self-care management [4][5] and an important source

Mailing address : Tomomi Horiguchi
Faculty of Health Sciences, Institute of Medical Pharmaceutical and Health Sciences, Kanazawa University
5 -11-80 Kodatsuno, kanazawa, Ishikawa 920-0942, Japan

of social support for adults with diabetes [6][7]. Furthermore, family support plays an essential role in diabetes treatment. However, depending on the type of family support, it can either promote or interfere with the patients' self-care [8]. On the other hand, several studies have reported that glycemic control does not always improve despite adequate family support [9-12]. Therefore, some patients do not experience the efficacy of family support. Hence, we believe that it is important to educate patients on how to recognize and maximize their family support. Reportedly, patients have the Ability to Recognize and Respond to Family support (ARRF), which consists of 'the ability to recognize family support' and 'the ability to respond to family support' [13]. A scale to evaluate ARRF has also been developed for Japanese people with T2DM [14]. ARRF measures the ability to receive with a positive attitude regardless of the attitudes of family members, rather than the ability to evaluate the attitudes of family members. Furthermore, ARRF measures the ability to respond to family support in daily interactions with family members.

A previous study identified a sex difference in ARRF in diabetic patients [15]. Specifically, there was a negative correlation between ARRF and HbA1c in men and a positive correlation between these two variables in women. In other words, men with high ARRF tended to have low HbA1c values. This suggests that even though they are generally not good at asking for help [16], men are more successful in achieving glycemic control. Choi emphasized the need for studies evaluating family support in male and female patients and its impact on blood glucose control [17]. Recently, care for patients and their families has focused on family members rather than the patients themselves [18]. Further clarification of the utility of ARRF in glycemic control in men can provide suggestions for new support targeting men with T2DM. Therefore, to improve the quality of patient education using ARRF as a predictor, we decided to study the impact of ARRF on men glycemic control.

By comparing good and poor blood glucose control groups among men with T2DM, this study (1) evaluated the correlations between ARRF, glycemic control, and self-care management, and (2) evaluated ARRF as a predictor of glycemic control.

Methods
Patients and study design

This cross-sectional study involved self-administered questionnaires. We evaluated the correlations among ARRF, self-care, and glycemic control management, and performed association-testing studies to evaluate ARRF as a predictor of glycemic control. Men with T2DM who met the following inclusion criteria were included: age $\geq$ 20 years, without serious diabetes complications (i.e., chronic kidney disease requiring dialysis, vision problems, cognitive impairment, and gangrene), and living with their families. Patients who did not agree to participate in this study were excluded.

Data were collected from T2DM outpatients who visited the hospital between February and June 2017. The participants were recruited from a single university hospital, which is a regional advanced medical facility in Japan. The primary physician, who agreed to cooperate in this study, invited eligible outpatients to participate. The researcher provided both written and oral explanations of the purpose of the study and the ethical considerations to all patients. Respondents were informed of the voluntary nature of participation, their right to refuse to answer any questions, and about the anonymization of their data. The questionnaire was administered at a location requested by the participant. Written informed consent was obtained from all patients, and the study was approved by the Medical Ethics Committee at our University (approval no. 661-2).

Measures
ARRF

The scale for measuring ARRF in Japanese T2DM patients consists of 22 items and can be used for Japanese T2DM patients without serious complications [14]. It consists of five subjective factors: (1) tendency of patients with diabetes

to seek emotional support from family members, (2) ability to negotiate their lifestyle with family members during diabetes therapy, (3) ability to adjust to family changes during diabetes therapy, (4) family confidence in the diabetes patient, and (5) shared family respect for lifestyle changes during diabetes therapy. Possible scores range from 22 to 110 points, with a higher score indicating a greater ability to accept family support. The internal consistency (Cronbach's alpha) of the scale was 0.93[14].

Self-care

The Self-Care Agency Questionnaire[19] consists of a 29-item scale and is used to assess the self-care ability of patients with chronic diseases. It includes four subscales: (1) ability to perform self-care activities, (2) ability to adjust one's physical condition based on personal weaknesses, (3) ability to concentrate attention on self-care, and (4) ability to receive good family support. Possible scores range from 29 to a maximum of 145 points, with a higher total score indicating greater self-care abilities.

Glycemic control

Blood glucose management was assessed based on to the most recent HbA1c value in the patient's medical record. The 2018 guidelines of the American Diabetes Association recommend that diabetic adults should maintain an HbA1c of < 7 % to reduce the risk of micro- and macro-vascular complications[20]. The Japanese standard is also the same[1]. Therefore, the patients in this study were divided into two groups according to their HbA1c levels: good glycemic control (HbA1c < 7 %) and poor glycemic control (HbA1c ≥ 7 %).

Socio-demographic information

Data on age, duration of diabetes, treatment method, and BMI were collected from the patients' medical records, and information on family size was obtained from the questionnaire responses.

Statistical analysis

Completed questionnaires were assigned individual ID numbers. There were no missing values, multiple answers, or non-responses in the responses to the ARRF, self-care, and HbA1c questions. The Mann–Whitney U test and Chi-square test were used to compare continuous variables, which were expressed as means ± standard deviations or the median (interquartile range), between the two groups. Spearman's correlation coefficient was used to evaluate the first research question, i.e., "Is there a correlation between glycemic control and self-care and ARRF?" A hierarchical multivariate analysis with a forced entry method was performed to answer the second research question: "Does ARRF impact glucose level outcomes?" Since existing predictors of HbA1c include demographic factors, such as the duration of diabetes[21-23] and clinical conditions, such as BMI[24][25], both factors were included in the data analysis. The HbA1c level was used as the dependent variable, and duration of diabetes and BMI were used as independent variables. Multicollinearity was confirmed by calculating the variance inflation factor (VIF). Residual analysis was performed to confirm that the data followed a normal distribution.

The required sample size was determined using G*Power 3.1 software (University of Dusseldorf, Germany)[26]. Assuming a large effect size of 0.3, an alpha level of 0.05, and up to three variables, G*Power 3.1 estimated that at least 41 subjects were necessary to obtain a power of 80% to detect a significant regression. Therefore, at least 82 participants were required for analysis in the two groups. Finally, 93 patients were included in this study. All statistical analyses were performed using the statistical software package SPSS (version 23.0 ; IBM Corp., Armonk, NY, USA) and all p-values of < 0.05 were considered statistically significant.

Results
Participant characteristics (Table 1)

The demographic and clinical characteristics of the 93 patients who met the inclusion criteria are listed in Table 1. Median patient age (range)

Table 1 Characteristics of the Study Sample

Variable	Category	Total (n=93)	Good group[a] (n=48)	Poor group[b] (n=45)	p Good vs. Poor
Age in years		66 (35−87)	68 (35−87)	65 (41−83)	0.23
Duration of diabetes, in years		12.0 (0.1−44.0)	12.0 (0.1−44.0)	14.5 (5.0−40.0)	0.22
HbA1c (%)		6.9 (5.5−10.7)	6.5 (5.5−6.9)	7.4 (7.0−10.7)	<0.01
BMI		24.1 (16.5−35.8)	23.6 (16.5−35.6)	24.6 (16.4−35.8)	0.11
ARRF		75 (48−98)	78.5 (48−89)	73 (56−98)	0.41
Self−care		110 (75−141)	111.5 (90−137)	107 (75−141)	0.22
Family size		3 (2−7)	2 (2−7)	3 (2−7)	0.49
Treatment method n (%)	Diet	27 (29.0)	15 (31.3)	12 (26.7)	0.74 †
	Exercise	25 (26.9)	14 (29.2)	11 (24.4)	0.73 †
	Oral agents	78 (83.9)	41 (85.4)	37 (82.2)	0.71 †
	Injection	41 (44.1)	13 (27.1)	28 (62.2)	<0.01 †
	Oral agents and injection	29 (31.2)	8 (16.7)	21 (46.7)	<0.01 †

Note. Mann-Whitney U test, †Chi-square test, a : Good glycemic control group (HbA1c < 7%), b : Poor glycemic control group (HbA1c ≥ 7%). Data are expressed as median (range) or n (%).
Abbreviations : HbA1C, glycated hemoglobin A1c ; ARRF, Ability to Recognize and Respond to Family support ; BMI, body mass index.

was 66 (35-87) years. The median HbA1c level and duration of diabetes were 6.9 (5.5-10.7) % and 12.0 (0.1-44.0) years, respectively. No significant differences were observed in median age, duration of diabetes, family size, BMI, ARRF, and self-care between the two groups. In terms of diabetes medication, significant differences in the use of injections ($\chi^2 = 12.6$, $p < 0.01$) and the combination of both oral drugs and injections ($\chi^2 = 11.0$, $p < 0.01$) were found between the two groups. More participants received injections in the poor than in the good glycemic control group.

Overall correlations between ARRF, self-care, and glycemic control

Although the overall correlation between ARRF and self-care was high (Spearman's rank correlation coefficient (rs) = 0.61, $p < 0.01$), there was no statistically significant correlation be-

tween ARRF and HbA1c (rs = −0.17, $p = 0.11$).

Correlations between ARRF, self-care, and glycemic control in the good and poor glycemic control groups (Table 2)

ARRF showed a positive correlation with self-care behaviors in both good (rs=0.58, $p < 0.01$) and poor (rs=0.61, $p < 0.01$) glycemic control groups. Furthermore, ARRF and glycemic control showed a significant negative correlation (rs = −0.30, $p = 0.04$) in the good control group, whereas there was no significant correlation between ARRF and HbA1c (rs = −0.02, $p = 0.88$) in the poor glycemic control group.

Effect of ARRF on HbA1c in the good glycemic control group

This study showed a significant negative correlation between ARRF and glycemic control in the good glycemic control group. Therefore, the

Table 2 Spearman's Rank Correlation Coefficient between ARRF, Glycemic Control (HbA1c), and Self-Care

		HbA1c	Self-care
ARRF	Good group[a] (n = 48)	−0.30*	0.58**
	Poor group[b] (n = 45)	−0.02	0.61**

Note. aGood group：Good glycemic control group (HbA1c < 7 %),
bPoor group：Poor glycemic control group (HbA1c ≥ 7 %).
Abbreviations：HbA1C, glycated hemoglobin A1c; ARRF, Ability to Recognize and Respond to Family support.
*$p < 0.05$, **$p < 0.01$

effect of ARRF on HbA1c was analyzed in the good glycemic control group. Table 3 presents the hierarchical multivariate analysis with a forced entry method of the effect of ARRF on HbA1c. There were no missing values, multiple answers, or non-responses in the responses to HbA1c, ARRF, duration of diabetes and BMI of the 48 patients who were analyzed. As shown in Step 1, the duration of diabetes (in years) and BMI explained approximately 13.0% of the total variance in HbA1c levels in the good glycemic control group ($p = 0.03$). Furthermore, during Step 2, there was a significant R^2 change with the addition of ARRF ($R^2 = 0.31$, $p < 0.01$), indicating a significant beneficial impact of ARRF on HbA1c

levels in the good glycemic control group. The standard partial regression coefficient of ARRF was −0.38 ($p = 0.01$). ARRF had a greater effect on HbA1c than did the other factors.

Discussion

This study demonstrated a significant correlation between ARRF and self-care in men with T2DM. Further, in the good glycemic control group, there was a statistically significant correlation between ARRF and HbA1c, and ARRF had a greater effect on glycemic control than did the duration of diabetes and BMI.

Family support has been reported to be related to self-care [27]. Likewise, family support plays a crucial role in the self-management of adult diabetic patients [28]. Although many studies have indicated that family support is related to self-management behaviors, this is the first study to report that patients' views of family support (e.g., ARRF) are related to self-management behaviors. This study raised a question about viewing patients as individuals who are dependent on family support. The results demonstrate that patients also play a role in enhancing the efficacy of family support, as well as their own ability to actively engage with their families. The results also indicated that ARRF is related to HbA1c levels; specifically, ARRF is a predictor of HbA1c. Although the importance of patient-fami-

Table 3 Multiple Regression Analyses of the Influence of ARRF on HbA1c in the Good Glycemic Control Group (n = 48)

Independent variable	Step 1			Step 2		
	β	p	VIF	β	p	VIF
Duration of diabetes	0.31	0.05	1.05	0.32	0.03	1.05
BMI	−0.23	0.15	1.05	−0.28	0.06	1.07
ARRF				−0.38	0.01	1.03
R^2	0.13	0.03		0.31	<0.01	
Adjusted R^2	0.17			0.25		

Note. Hierarchical multivariate analysis with a forced entry method.
Abbreviations: HbA1c, glycated hemoglobin A1c; BMI, body mass index; ARRF, Ability to Recognize and Respond to Family support; β, standardized partial regression coefficient, VIF, variance inflation factor; R^2, coefficient of determination.

ly education on glycemic control in diabetes mellitus has been long known, previous studies have noted that the most effective intervention for reducing HbA1c levels is patient education[29) 30)]. The findings of this study support the importance of focusing on patients to improve the relationship between patients and family members using ARRF. No studies have shown that family education improves HbA1c levels. Instead, patient education using ARRF might improve family support. In other words, the simultaneous use of patient-family education on glycemic control and patient education to improve ARRF might work synergistically to improve glycemic control in patients. Additionally, families of diabetic patients have been reported to experience a high psychological burden and a low quality of life[31)]. Patient education on how to recognize family support might reduce the family's burden and the conflict between patients and their family members.

This study also found that ARRF has a greater impact on HbA1c levels than the duration of diabetes or BMI. The existing predictors of HbA1c include demographic factors, such as the duration of diabetes[20–22)], and clinical parameters, such as BMI[24) 25)]. Interestingly, ARRF, which is the patients' recognition of support, had a greater effect on HbA1c than the above-mentioned clinical characteristics. The duration of diabetes is unchangeable. Furthermore, it is difficult to control BMI because it is affected by many factors[32)]. Conversely, improved ARRF might provide long-term glycemic control in patients, independent of demographic factors and clinical conditions. Therefore, providing educational interventions to improve ARRF might prevent diabetic complications.

In the poor glycemic control group in this study, ARRF correlated significantly with self-care, but not with glycemic control, suggesting that it is challenging to improve glycemic control by educational interventions alone in patients education using ARRF with men with poor glycemic control. The American Association of Diabetes Educators[33)] recommends diabetes care support, which considers intermediate and long-term outcomes, such as behavioral changes, to improve outcomes in diabetic patients. The significant correlation between ARRF and self-care behaviors, which are intermediate behavioral goals, suggests that ARRF might also serve as an important predictor of long-term outcomes in the poor glycemic control group.

This study identified a significant correlation between ARRF and self-care in men with T2DM. Moreover, there was a significant correlation between ARRF and glycemic control in the good glycemic control group, indicating that ARRF is a predictor of HbA1c. The above results suggest that ARRF can serve as a predictor of the efficacy of educational interventions for diabetes control and daily activity levels in men with T2DM.

This study has some limitations. First, this was a single-center cross-sectional study that collected data from an advanced treatment hospital; therefore, the findings cannot be generalized to the general population, and it is necessary to conduct the investigation including facilities other than advanced treatment hospitals. Second, this study showed that men with T2DM might become an intervention point in the relationship between the patient and their family; however, the specific methods for such interventions remain unclear. Further research is necessary to plan and implement effective interventions in future studies.

Conclusions

This study revealed that ARRF plays an essential role and can serve as a predictor of the efficacy of educational interventions for diabetes control in men with T2DM, and that patients' education about ARRF is required to prevent or delay diabetes-related complications. ARRF is useful for good glycemic control in men with T2DM.

References

1 ） The Japan Diabetes Society：The goals and principles for treatment of diabetes, The Japan diabetes society, Clinical Practice Guideline for the Treatment of Diabetes, Nankoudou, 27－35, Tokyo, 2024 (in Japanese)

2 ） Davies AK, McGale N, Humphries SE, et al.： Effectiveness of a self-management intervention with personalised genetic and lifestyle-related risk information on coronary heart disease and diabetes-related risk in type 2 diabetes (CoRDia)：study protocol for a randomised controlled trial. Trials, 16, 547, 2015.

3 ） Saad AMJ, Younes ZMH, Ahmed H, et al.： Self-efficacy, self-care and glycemic control in Saudi Arabian patients with type 2 diabetes mellitus: A cross-sectional survey. Diabetes Research and Clinical Practice, 137, 28－36, 2018

4 ） Rosland AM, Heisler M, Choi HJ, et al.： Family influences on self-management among functionally independent adults with diabetes or heart failure: do family members hinder as much as they help?. Chronic Illness, 6 (1), 22 －33, 2010

5 ） Xu Y, Toobert D, Savage C, Pan W, et al.： Factors influencing diabetes self‐management in Chinese people with type 2 diabetes. Research in Nursing & Health, 31(6), 613－625, 2008

6 ） Fisher L, Chesla CA, Bartz RJ, et al.：The family and type 2 diabetes: A framework for intervention. The Diabetes Educator, 24(5), 599－607, 1998

7 ） Tang TS, Brown MB, Funnell MM, et al.： Social support, quality of life, and self-care behaviors among African Americans with type 2 diabetes. The Diabetes Educator, 34(2), 266－276, 2008

8 ） Mayberry LS, Osborn CY：Family involve-ment is helpful and harmful to patients' self-care and glycemic control. Patient Education and Counseling, 97(3), 418－425, 2014

9 ） Gary TL, Batts-Turner M, Yeh HC, et al.： The effects of a nurse case manager and a community health worker team on diabetic control, emergency department visits, and hospitalizations among urban African Americans with type 2 diabetes mellitus：A randomized controlled trial. Archives of Internal Medicine, 169(19), 1788–1794, 2009

10） Hu J, Wallace DC, McCoy TP, et al.: A family-based diabetes intervention for Hispanic adults and their family members. The Diabetes Educator, 40(1), 48–59, 2014

11） Kang CM, Chang SC, Chen PL, et al.: Comparison of family partnership intervention care vs. conventional care in adult patients with poorly controlled type 2 diabetes in a community hospital：A randomized controlled trial. International Journal of Nursing Studies, 47(11), 1363－1373, 2010

12） Williams IC, Utz SW, Hinton I, et al.： Enhancing diabetes self-care among rural African Americans with diabetes: results of a two-year culturally tailored intervention. The Diabetes Educator, 40(2), 231－239, 2014

13） Horiguchi T, Inagaki M, Tasaki K：Thoughts of type Ⅱ diabetes patients with no severe complications about their families. The Journal of Japan Academy of Diabetes Education and Nursing, 14(2), 130－137, 2010 (in Japanese)

14） Horiguchi T, Inagaki M, Tasaki K：A scale for Japanese type 2 diabetes patient ability to recognize and respond to family support: during the time without serious complications. Journal of the Tsuruma Health Science Society Kanazawa University, 37(1), 23－32, 2013

15） Horiguchi T, Inagaki M, Tasaki K, et al.： The relationship between the Ability to Recognize and Respond to Family support (ARRF) and HbA1c in people with type 2 diabetes by gender. The Journal of Japan Academy of Diabetes Education and Nursing, 24(1), 1－18, 2020

16） Sears HA, Graham J, Campbell A： Adolescent boys' intentions of seeking help

from male friends and female friends. Journal of Applied Developmental Psychology, 30(6), 738－48, 2009

17) Choi SE：Diet-specific family support and glucose control among Korean immigrants with type 2 diabetes. The Diabetes Educator, 35(6), 978－985, 2009

18) Thirsk LM, Schick-Makaroff K：Family interventions for adults living with type 2 diabetes mellitus：A qualitative meta-synthesis. Patient Education and Counseling. 104(12), 2890－2899, 2021

19) Honjo K：Revision of the Self-Care Agency Questionnaire for patients with chronic illness. Journal of Japan Academy of Nursing Science, 21(1), 29－39, 2001 (in Japanese)

20) American Diabetes Association: Standards of medical care in diabetes-2017. Diabetes Care, 40, 985, 2017

21) Ahmad NS, Islahudin F, Paraidathathu T：Factors associated with good glycemic control among patients with type 2 diabetes mellitus. Journal of Diabetes Investigation, 5(5), 563－569, 2014

22) Juarez DT, Sentell T, Tokumaru S, et al.: Factors associated with poor glycemic control or wide glycemic variability among diabetes patients in Hawaii, 2006-2009. Preventing Chronic Disease, 9, 120065, 2012

23) Khattab M, Khader YS, Al-Khawaldeh A, et al.：Factors associated with poor glycemic control among patients with type 2 diabetes. Journal of Diabetes and its Complications, 24(2), 84－89, 2010

24) Ferwana M, Abdulmajeed I, Madani WA, et al.：Glycemic control and accompanying risk factors: 4-year primary care study. Journal of Diabetes & Metabolism, 6(4), 523, 2015

25) Guerci B, Drouin P, Grangé V, et al.：Self-monitoring of blood glucose significantly improves metabolic control in patients with type 2 diabetes mellitus: the Auto-Surveillance Intervention Active (ASIA) study. Diabetes & Metabolism, 29(6), 587－594, 2003

26) Faul F, Erdfelder E, Lang AG, et al.: G* Power 3 : A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. Behavior Research Methods, 39(2), 175－191, 2007

27) Chlebowy DO, Hood S, Lajoie AS：Facilitators and barriers to self-management of type 2 diabetes among urban African American adults: focus group findings. The Diabetes Educator, 36(6), 897－905, 2010

28) Rintala TM, Jaatinen P, Paavilainen E, et al.: Interrelation between adult persons with diabetes and their family: a systematic review of the literature. Journal of Family Nursing, 19(1), 3－28, 2013

29) Chrvala CA, Sherr D, Lipman RD：Diabetes self-management education for adults with type 2 diabetes mellitus：A systematic review of the effect on glycemic control. Patient Education and Counseling, 99(6), 926－943, 2016

30) Windrum P, García-Goñi M, Coad H：The impact of patient-centered versus didactic education programs in chronic patients by severity: the case of type 2 diabetes mellitus. Value in Health, 19(4), 353－362, 2016

31) Holt RIG, Kalra S：A new DAWN：Improving the psychosocial management of diabetes. Indian Journal of Endocrinology and Metabolism, 17(Suppl 1), S95－99, 2013

32) Sharma AM, Padwal R：Obesity is a sign–over-eating is a symptom：an aetiological framework for the assessment and management of obesity. Obesity Reviews, 11(5), 362－370, 2010

33) American Association of Diabetes Educators：AADE7™ Self-care behaviors. The Diabetes Educator, 34, 445－449, 2008

男性２型糖尿病患者の血糖コントロールにおける
家族サポート感取・対応力（ARRF）の有用性

堀口　智美，稲垣　美智子，浅田　優也

金沢大学医薬保健研究域保健学系

キーワード
２型糖尿病，ARRF，家族サポート，血糖コントロール，セルフケア

要　　旨

目的：男性２型糖尿病患者の血糖コントロールにおける家族サポート感取・対応力（ARRF）の有用性を
　　　検討することである。

方法：本研究は横断研究であり、男性２型糖尿病患者を対象に自記式質問紙調査を行った。質問紙調査の
　　　項目は、ARRF、セルフケア、同居家族の人数であり、患者の基本情報および血糖コントロール（HbA1c）
　　　に関するデータはカルテより収集した。分析において患者はHbA1c値により、良好群（HbA1c＜
　　　７％）と不良群（HbA1c≧７％）の２群に分けられた。

結果：有効回答者は93名であり、良好群が48名、不良群が45名であった。ARRFとセルフケアは両群にお
　　　いて正の相関がみられた。ARRFとHbA1cは良好群で負の相関がみられたが、不良群では相関はみ
　　　られなかった。HbA1cを従属変数とした多変量回帰分析の結果、良好群において糖尿病治療歴と
　　　BMIの決定係数 (R^2) は0.13（p＝0.03）であったが、ARRFを加えるとR^2は0.31（p＜ 0.01）に上昇
　　　した。

結論：ARRFは男性２型糖尿病患者の良好な血糖コントロールに有用であることが示唆された。