LIFE SATISFACTION, DISEASE MANAGEMENT ATTITUDES AND NUTRITIONAL STATUS OF DIABETES MELLITUS PATIENTS IN AZAD KASHMIR, PAKISTAN: A HOSPITAL BASED CROSS-SECTIONAL STUDY

© Aisha Jalil[1]*, Ahmed Usman[2], Sobia Akram[3], Nazish Zulfiqar[3], Wajeeha Arshad[3]

[1]School of Integrated Social Sciences, University of Lahore, Lahore, Pakistan
[2]Institute of Social and Cultural Studies, University of the Punjab, Lahore, Pakistan
[3]Department of Home Economics, Mirpur University of Science and Technology, Azad Kashmir, Pakistan

BACKGROUND: The life satisfaction of diabetes mellitus patients in association with the disease management attitudes and nutritional status have never been investigated yet in Pakistani administered Azad Jammu & Kashmir.

AIM: The purpose of this study is to analyze the patient satisfaction about life with diabetes mellitus in association with disease management and nutritional status.

METHODS: A cross sectional survey was conducted among 496 patients in DHQ hospital, Mirpur Azad Jammu & Kashmir. The questionnaire comprised of two sections: 1) Diabetes Attitude Scale (DAS-3); 2) Patient profile, DM history, nutritional status and dietary habits. The findings are generated by binary logistic regression and multivariate regression analyses.

RESULTS: Overall, 64% of the patients interviewed reported dissatisfaction with their life with DM. Majority of the patients were females (66%), BMI value above 25.0 (56%). Gender male (AOR=1.82; 95%CI=1.15-2.88) and low income (AOR=3.16; 95%CI= 1.13-8.80) and middle income (AOR=4.70; 95%CI=1.52-15.5) were significantly associated with life dissatisfaction. There was higher likelihood of life dissatisfaction among patients with low food intake (AOR=1.82; 95%CI= 1.20-2.76); patients' belief on: no need of taking insulin to treat their diabetes have a mild disease (AOR=1.56; 95%CI= 1.01-2.41); not much use in trying to have good blood sugar control because complications of diabetes happen anyway (AOR= 1.63; 95%CI= 1.18-2.23); emotional effects of diabetes are small (AOR=1.47; 95%CI= 1.02-2.14); decisions regarding daily diabetes care should be made by the patient (AOR= 2.15; 95%CI= 1.19-3.88).

CONCLUSION: Findings implied the need of organizing counselling sessions for DM patients that promote regular physical activity to improve health and disease management. The consultation and regular visits of a nutritionist may help the patients in achieving better health outcomes.

КЛЮЧЕВЫЕ СЛОВА: Life satisfaction; diabetes mellitus; disease management; nutritional status; dietary habits; Azad Kashmir

УДОВЛЕТВОРЕННОСТЬ ЖИЗНЬЮ, ОТНОШЕНИЕ К ЛЕЧЕНИЮ ЗАБОЛЕВАНИЯ И АЛИМЕНТАРНЫЙ СТАТУС БОЛЬНЫХ САХАРНЫМ ДИАБЕТОМ В АЗАД-КАШМИРЕ, ПАКИСТАН: ОДНОМОМЕНТНОЕ ПОПЕРЕЧНОЕ ИССЛЕДОВАНИЕ НА БАЗЕ БОЛЬНИЦЫ

© Aisha Jalil[1]*, Ahmed Usman[2], Sobia Akram[3], Nazish Zulfiqar[3], Wajeeha Arshad[3]

[1]School of Integrated Social Sciences, University of Lahore, Лахор, Пакистан
[2]Institute of Social and Cultural Studies, University of the Punjab, Лахор, Пакистан
[3]Department of Home Economics, Mirpur University of Science and Technology, Азад-Кашмир, Пакистан

АКТУАЛЬНОСТЬ. Удовлетворенность жизнью больных сахарным диабетом (СД) в связи с отношением к лечению болезни и алиментарным статусом никогда еще не исследовалась в Азад-Джамму и Азад-Кашмире, Пакистан.

ЦЕЛЬ. Целью данного исследования является анализ удовлетворенности жизнью, а также лечения заболевания и алиментарного статуса, у пациентов с СД.

МЕТОДЫ. Было проведено одномоментное поперечное исследование среди 496 пациентов в госпитале DHQ, в Мирпуре, в Азад-Джамму и Азад-Кашмире. Анкета состояла из двух разделов: I) Шкала отношения к диабету (DAS-3); II) Профиль пациента, СД в анамнезе, алиментарный статус и пищевые привычки. Результаты были получены посредством бинарной логистической регрессии и анализа методом множественной регрессии.

РЕЗУЛЬТАТЫ. В целом 64% опрошенных пациентов отмечали неудовлетворенность своей жизнью при СД. Большинство пациентов были женщины (66%), значение ИМТ было выше 25,0 (56%). Мужской пол (скорректированное отношение шансов (СОШ)=1,82; 95% ДИ=1,15–2,88), а также низкий доход (СОШ=3,16; 95% ДИ=1,13–8,80) и средний доход (СОШ=4,70; 95% ДИ=1,52–15,5) были значительно связаны с неудовлетворенностью жизнью. Вероят-

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ность неудовлетворенности жизнью была выше у пациентов с низким уровнем потребления пищи (СОШ=1,82; 95% ДИ=1,20–2,76); уверенность пациентов в том, что нет необходимости принимать инсулин для лечения диабета при легкой форме заболевания (СОШ=1,56; 95% ДИ=1,01–2,41); незначительная польза попыток достижения надлежащего контроля сахара в крови, поскольку осложнения диабета неизбежны (СОШ=1,63; 95% ДИ=1,18–2,23); эмоциональные факторы диабета незначительны (СОШ=1,47; 95% ДИ=1,02–2,14); пациент должен принимать решения касательно ежедневного лечения диабета (СОШ=2,15; 95% ДИ=1,19–3,88).

ЗАКЛЮЧЕНИЕ. Полученные данные свидетельствуют о необходимости организации консультативных сессий для пациентов с СД, которые будут способствовать регулярной физической активности для улучшения состояния здоровья и лечения заболевания. Предположительно, в достижении лучших результатов в состоянии здоровья пациентам помогут консультации и регулярные обращения к диетологу.

KEYWORDS: удовлетворенность жизнью; сахарный диабет; лечение заболевания, алиментарный статус; пищевые привычки; Азад-Кашмир

Life satisfaction of diabetes mellitus patients depends on their expectations and evaluations of the quality of healthcare services, accomplishment of disease management goals, and nutritional wellbeing [1]. It is a complex phenomenon that can be understood and explained by an interdisciplinary approach including medicine, psychology, sociology, physiology and dietetics. Resilience studies demonstrate that the early adults with diabetes mellitus (DM) might face interrupted medical care due to the social factors. The interrupted care of DM results in the increased risk for suboptimal glycemic control, early onset of diabetes-related chronic complications, and preventable mortality [2]. In this study, we used Corathers and colleagues' (2017) Health Resilience Model (HRM) that distinguished between modifiable (family support, disease management attitude and wellbeing) and non-modifiable (age, gender and type of diabetes) patient characteristics.

Patient's perspective on disease management, dietary behaviors and nutritional status is considered as an authentic indicator of the healthcare quality. In developing countries, the situation of knowledge, attitude, and practice of diabetes mellitus patients is much worse than those in developed countries, perhaps because of the non-realization of the importance of nutritional status, unavailability of nutritionists in public hospitals and the lack of training programs for care providers and counseling programs for patients [3].

Physical activity is also another important factor of controlling blood sugar levels [4]. The patients with poorly controlled diabetes have increased risk of long-term complications and high risk of developing other medical issues [5, 6]. In Pakistan, the diagnosis of diabetes is also delayed. The lack of facilities for diabetes screening at public healthcare services is the major factor hindering the early diagnosis of diabetes [7]. The common eating habits, leisure activities and absence of physical activity are other significant factors. Unfortunately, the nutrition and dietitian professions are largely ignored in Pakistan and Azad Kashmir. People are generally unaware of the importance of diet and nutrition in disease management perhaps because of strong belief system rooted in the cultural anatomy that contrasts the rules of gross Human Anatomy in medicine. Azad Jammu & Kashmir is a Pakistan administered territory that is rarely studied with reference to public health. To our knowledge, no research has been done on the life satisfaction, disease management, nutrition status of DM patients in Azad Kashmir.

AIM

The purpose of this study was to assess: (i) the life satisfaction of diabetes mellitus patients in association with the disease management attitudes, disease history, physical activity and nutritional status; (ii) the association among the profile characteristics of patients and life satisfaction.

METHODS

Research design

We conducted a cross-sectional survey among diabetes mellitus patients through face-to-face interviews. The total number of 496 patients were approached for participation in this survey. Out of which 450 respondents completed the interview. However, 46 (9.5%) patients left their interview incomplete. The self-administered questionnaire method could not be adopted for data collection because most patients in public hospitals were illiterate.

Conformity criteria

The in-admission, adult patients (18 years of age and above) with diabetes mellitus were approached because the questionnaire was comprehensive. The patients in critical condition and those who refused to participate were excluded from this study.

Research facilities

The hospital provided the researchers with the weighing machines and scales to take the anthropometric measurements needed to calculate the BMI of the patients. The hospital facilitated the interviewers in using the admission registers to identify the patients. The principal investigator supervised and visited the data enumerators on regular basis in the hospital throughout the data collection phase.

Research duration

The data was collected from 3rd August 2018 to 26th December 2018 from District Headquarter hospital, Mirpur, Azad Jammu & Kashmir, Pakistan; which is the largest public hospital in the region. Data was collected on weekdays. Patients were admitted in dialysis centre and medicine wards.

Study tool

Since, a comprehensive questionnaire with 75 items was used. The DAS was originally developed and revised by Anderson and colleagues [8, 9] among patients associated with

University of Michigan Diabetes Research and Training Center. Lou and colleagues (2014) checked validity and internal consistency for Chinese version of DAS-3 [10]. The questionnaire comprised on three sections: social demographics, Diabetes Attitude Scale (DAS 3) and KAP about dietary habits, disease management and nutritional status. The measurement of height and weight of patients were also taken to calculate the BMI. The diagnosis and level of anaemia was taken from the recent test reports provided by the patients. The tool items for life satisfaction, dietary habits, disease management and nutritional status were developed after extensive literature review of relevant studies [11, 12].

Tool translation

The questionnaire was first translated individually by all researchers. The translation was done with careful consideration of the actual intent of DAS 3 statements meanwhile making it suitable for the context of Azad Kashmir. The researchers arrived at a final Urdu version after discussion on multiple sittings. The translation was then sent to an Urdu language expert for copy editing. The approved version was pre-tested with 25 patients seeking medical care in outdoor medicine department.

Training of data enumerators

Two graduate students of food and nutrition were hired and trained by the researchers for two weeks prior to the data collection. The training sessions of data enumerators were completed prior to the initiation of data collection phase. The interviewers had previous experience of data collection for health surveys and possessed graduation degree in Human Nutrition. The training sessions were based on the research ethics, survey method, translated instrument, and revision of basics in DM and nutrition.

Pilot study

Urdu translation was pilot tested with 25 patients prior to data collection. The tool was improved to address the minor issues raised by the respondents and observations of interviewers.

Patient characteristics

Besides DAS 3, physical activity and nutritional status, we collected data from respondents on the baseline characteristics: gender, age, occupation, education, and family income. DM history was indicated by mode of treatment, duration/type of diabetes, comorbidities, present condition and consultation frequency with diabetologist and nutritionist. Additionally, respondents were asked about their level of understanding about the food quantity and sugar component of food items in diet chart. The patients were deficient of the knowledge about the quality of their glycemic control.

The main research outcome

The outcome variable was 'satisfaction about life with diabetes, which was assessed by a statement: "overall, I am satisfied with my life with diabetes" as an additional question to the part 1 of questionnaire. The responses were initially obtained on five-point Likert scale as: strongly agree to strongly disagree. However, the two categories: satisfied and dissatisfied were created based on frequency distributions extracted in the first phase of data analysis.

Ethical Clearance and permissions

The permission was obtained from the DHQ hospital before conducting the research study on 24th July 2018. The informed consent was obtained from the patients. The permissions were obtained from *Mapi* Trust Org, University of Michigan, Diabetes Research and Training Centre on 8th August 2018; before translating DAS 3 into Urdu language. The research methodology of this study was approved by the Office of Research, Innovation and Commercialization, Mirpur University of Science and Technology. The hired interviewers and the patients were explained about the objectives of this research. We did not receive any funding to conduct this study. The patients were not provided any monetary benefit for their responses.

Statistical analysis

*The principles of samples size calculating***:** The representative sample was calculated using prevalence formula of Fox and colleagues (2007) with: ± 4.5 Margin of Random Error, 95% confidence interval, 1.96 margin of random error and an estimated 50% prevalence of patient satisfaction in the absence of previous studies in the selected research setting. The sample size of 472 diabetes patients was further adjusted for a 5% non-response rate. Thus, the total sample size for this study was 496.

*Statistical data analysis methods***:** Data storage and analysis were carried out using SPSS (version 22.0). Bivariate analyses and multinomial logistic regression model were used to generate the quantitative findings. The results are indicated by Adjusted Odds Ratio, 95% Confidence Interval and p value <0.05.

RESULTS

Research respondents' social demographic characteristics

The average age of respondents was 51.5 ± 14.8. Most of the respondents, 232 among 450 patients, were illiterate. And the literate patients reported to have attained initial level of schooling or the ability to read and write in national language (Urdu). Majority of the diabetes patients encountered during data collection were females (65.8%). The patients who were unemployed or dependent on family members for financial support comprised of (65.6%). Overall, more than 83% of patients had monthly family income less than 20,000 PRs. (Approximately 142 US$). Around 88% of the patients came from Mirpur and locations in the surroundings in Azad Kashmir (Table 1).

Disease related facts

The patients were asked about the history of diabetes mellitus. Out of 450 patients, 61% reported to have been suffering from Type 1 DM. Around 89% of patients were interviewed in stable condition whereas 11% were in critical condition. 26% of the patients reported to have several visits of diabetologist in one month. Around 41% patients reported to have visited their diabetes specialist at least once in a month. Regarding life satisfaction with DM, 64% patients reported dissatisfaction with their live (See Table 2).

Nutritional Status of patients

Most of the patients were obese (56%). Overall, 91% patients reported to have never consulted a nutritionist.

Table 1. Life Satisfaction with diabetes mellitus in association with patient's profile & disease history (n=450)

Variable	F (%)	Exp (B) (95% CI)	Exp (B) (95% CI)
Gender			
Male	153 (34.2)	2.04 (1.32–3.14) **	1.82 (1.15–2.88) *
Female[1]	297 (65.8)		
Age			
18–35	77 (17)	1.52 (0.85–2.75)	
36–55	207 (46)	1.05 (0.69–1.61)	
56 and above[1]	166 (37)		
Occupational status			
Working	155 (34.4)	1.58 (1.04–2.41) ***	
Unemployed[1]	295 (65.6)		
Educational Status			
Literate	232 (51.6)	1.00 (0.68–1.47)	
Illiterate [1]	218 (48.4)		
Family income (monthly)^			
Lowest to 20,000	374 (83.1)	3.21 (0.92–11.25)	3.16 (1.13–8.80) **
20,001–50,000	65 (14.4)	5.45 (1.40–21.17) **	4.70 (1.52–15.5) ***
50,001 and above [1]	11 (2.4)		
Mode of treatment			
Medicine [1]	176 (39)		
Insulin	274 (61)	1.60 (1.26–2.04) ***	
How long you have been living with diabetes?			
Less than and one year	28 (6)	2.50 (1.10–5.68) **	
Between 1–5 years	138 (31)	1.60 (1.14–2.26) **	
6–10	143 (32)	1.86 (1.32–2.62) ***	
11–20	129 (29)	1.80 (1.26–2.59) ***	
More than 20 years [1]	12 (2.4)		
Present Condition			
Normal / Stable [1]	402 (89)		
Critical	48 (11)	1.89 (1.54–2.32) ***	
Ever consulted nutritionist			
Yes [1]	40 (9)		
No	410 (91)	1.83 (1.49–2.24) ***	

Notes: 1 Reference category; ^ in Pakistani Rupee. The table indicates the variables found significant in binary logistic regression and multivariate logistic analysis. P value < 0.05; (*<0.05, **<0.01, ***<0.001)

Table 2. Satisfaction about life, patient's disease and nutritional profile pertaining to diabetes mellitus (n=450)

Variable	F (%)
Type of DM	
Type 1	276 (61)
Type 2	174 (39)
Visit to diabetologist	
Several times in a month	118 (26)
Once in a month	183 (41)
Once in six months	77 (17)
Once in year/ After year/ irregular	72 (17)
Satisfaction about life with diabetes	
Yes satisfied	161 (36)
Not satisfied	289 (64)
BMI	
Underweight (less than 18.5)	14 (3)
Healthy (18.5-24.9)	185 (41)
Overweight (over 25)	251 (56)
Ever consulted a nutritionist	
Yes	40 (9)
No	410 (91)

Variable	F (%)
Number of meals per day	
1 or 2 times	39 (8.7)
3 times a day	360 (80)
4 times a day	35 (8)
5 or more times	16 (4)
Diagnosis of anemia	
Yes	121 (27)
No	329 (73)
Doctor told about importance of taking balanced diet	266 (59)
Yes	184 (41)
No	
Ease of following diet charts	
Yes	181 (40)
No	269 (60)
Understand of quantity and sugar component of food items in diet chart	
Yes	181 (40)
No	269 (60)

The female patients (27%) were diagnosed to have anemia by their doctors. In addition to this, majority of the patients believed that their doctors told them about the importance of taking balanced diet. Due to lack of education, patients were unable to understand the importance and utilization of diet chart.

Primary findings

The binary logistic regression analysis revealed significant association of life satisfaction with gender female, unemployment and low family income. The age and educational attainment remained insignificantly associated with the outcome variable. We observed significantly higher likelihood of being dissatisfied about life with DM among patients who were: male (unadjusted OR= 2.04; 95%CI= 1.32-3.14); employed/ working (unadjusted OR= 1.58; 95%CI= 1.04-2.41) (See Table 3). In multivariate analysis, gender (AOR=1.82; 95%CI=1.15-2.88) and family income less than 20,000 (AOR=3.16; 95%CI= 1.13-8.80) and middle income (AOR=4.70; 95%CI=1.52-15.5) were significantly associated with life satisfaction.

Table 3. Dimensions and indicators of diabetes attitudes in association with Patient satisfaction about life with diabetes mellitus

	Life Satisfaction			Bivariate analysis	Multivariate Logit Model
Scale Item	**Variable**	**Response**	**F (%)**	**Exp (b) 95%CI Sig**	**Exp (b) 95%CI Sig**
		Need for Special Training			
DM01	health care professionals should be taught how daily diabetes care affects patients' lives.	Agree [1] Don't know Disagree	444 (98) 5 (1) 1 (0.2)	 .83 (.06–2.21) .00 (.00)	
DM06	health care professionals should be taught how daily diabetes care affects patients' lives.	Agree [1] Don't know Disagree	408 (91) 25 (5.6) 17 (3.8)	 .28 (.12–.66) ** .57 (.22–1.51)	
DM10	it is important for the nurses and dietitians who teach people with diabetes to learn counseling skills.	Agree [1] Don't know Disagree	403 (90) 34 (7.6) 12 (2.7)	 2.78 (1.30–5.95) ** 1.15 (.34–3.38)	 3.36(1.40–8.01) **
DM17	health care professionals should learn how to set goals with patients, not just tell them what to do.	Agree [1] Don't know Disagree	399 (89) 22 (5) 29 (6.4)	 1.87 (1.52–2.99) *** 1.00 (.43–2.31)	
DM20	to do a good job, diabetes educators should learn a lot about being teachers.	Agree [1] Don't know Disagree	410 (91) 31 (7) 6 (1.3)	 1.39 (.56–1.57) 2.00 (.19–5.98)	
		Seriousness of Non-Insulin Dependent Diabetes Mellitus			
DM02	people who do not need to take insulin to treat their diabetes have a mild disease.	Agree Don't know Disagree [1]	139 (31) 202 (45) 109 (24)	1.25 (1.11–2.21) ** 1.14 (.68–1.92)	1.56 (1.01–2.41) *
DM07	older people with Type 2 diabetes does not usually get complications.	Agree Don't know Disagree [1]	215 (48) 112 (25) 123 (27)	1.76 (.58–1.47) *** 1.73 (.53–1.55) **	
DM11	people whose diabetes is treated by just a diet do not have to worry about getting many long-term complications.	Agree Don't know Disagree [1]	225 (50) 135 (30) 90 (20)	1.89 (1.43–2.48) *** .61 (.35–1.08)	
DM15	blood sugar testing is not needed for people with Type 2 diabetes.	Agree Don't know Disagree [1]	160 (36) 136 (30) 154 (34)	1.71 (1.24–2.36) *** 1.65 (1.16–2.33) ***	
DM21	Type 2 diabetes is a very serious disease.	Agree [1] Don't know Disagree	263 (58) 162 (36) 25 (5.6)	 1.80 (1.40–2.31) *** 1.84 (1.33–2.55) ***	 1.62 (1.09–2.04) *
DM25	Type 2 is as serious as Type 1 diabetes.	Agree [1] Don't know Disagree	269 (60) 157 (35) 24 (5)	 1.92 (1.50–2.76) *** 1.57 (1.14–2.17) ***	
DM31	Patients on pills should be as concerned about their blood sugar as patients on insulin.	Agree [1] Don't know Disagree	417 (93) 21 (5) 11 (2.4)	 2.00 (.81–4.96) 1.75 (.51–5.98)	

Продолжение табл. 3

Life Satisfaction				Bivariate analysis	Multivariate Logit Model
Scale Item	**Variable**	**Response**	**F (%)**	**Exp (b) 95%CI Sig**	**Exp (b) 95%CI Sig**
		Value of Tight Control			
DM03	there is not much use in trying to have good blood sugar control because complications of diabetes happen anyway.	Agree Don't know Disagree [1]	212 (47) 130 (29) 108 (24)	.81 (.50–1.32) .85 (.49–1.45)	1.63 (1.18-2.23) *** 1.61 (1.09-2.41) ***
DM08	keeping the blood sugar close to normal can help to prevent the complications of diabetes.	Agree [1] Don't know Disagree	346 (77) 89 (20) 15 (3.3)	1.18 (.41–3.39) 1.31 (.43–4.03)	
DM12	diabetes patient should do whatever it takes to keep their blood sugar close to normal.	Agree [1] Don't know Disagree	390 (87) 45 (10) 15 (3)	 1.80 (1.47–2.22) ** 2.75 (.88–8.64)	
DM16	low blood sugar reactions make tight control too risky for most people.	Agree [1] Don't know Disagree	361 (80) 63 (14) 26 (6)	1.56 (.92–2.52) 2.25 (.98–5.18)	
DM23	Type 2 diabetes patients will probably not get much payoff from tight control of their blood sugars.	Agree Don't know Disagree [1]	223 (50) 144 (32) 83 (18)	1.93 (1.47–2.55) *** 1.67 (1.19–2.34) **	1.53 (1.04–2.26) *
DM26	tight control is too much work.	Agree [1] Don't know Disagree	401 (89) 24 (5.3) 25 (5.6)	 1.40 (.62–3.15) 2.12 (.92–4.92)	
DM28	tight control of blood sugar makes sense only for people with Type 1 diabetes.	Agree Don't know Disagree [1]	117 (26) 220 (49) 113 (25)	1.93 (1.31–2.82) *** 1.77 (1.35–2.34) ***	
		Psychosocial Impact of DM			
DM04	diabetes affects every part of a diabetic person's life.	Agree [1] Don't know Disagree	362 (80.4) 59 (13) 29 (6.4)	 1.60 (.86–2.91) .96 (.44–2.10)	
DM13	the emotional effects of diabetes are small.	Agree Don't know Disagree [1]	243 (54) 101 (22) 106 (24)	2.06 (1.36–3.12) *** 1.72 (1.16–2.55) **	1.47 (1.02–2.14) *** 1.87 (1.11–3.14) ***
DM18	diabetes is hard because you never get a break from it.	Agree [1] Don't know Disagree	328 (73) 44 (10) 78 (17)	 1.00 (.55–1.81) 2.50 (1.53–4.10) *	
DM22	having diabetes changes a person's outlook on life.	Agree [1] Don't know Disagree	334 (74) 75 (17) 41 (9)	 2.57 (1.55–4.26) *** 1.56 (.83–2.92)	
DM29	it is frustrating for people with diabetes to take care of their disease.	Agree Don't know Disagree [1]	139 (31) 113 (25) 198 (44)	1.28 (.92–1.79) 2.32 (1.55–3.47) ***	
DM33	support from family and friends is important in dealing with diabetes.	Agree [1] Don't know Disagree	290 (64) 71 (16) 89 (20)	 1.63 (1.01–2.63) ** 1.97 (1.27–3.05) ***	

Окончание табл. 3

Life Satisfaction				Bivariate analysis	Multivariate Logit Model
Scale Item	**Variable**	**Response**	**F (%)**	**Exp (b) 95%CI Sig**	**Exp (b) 95%CI Sig**
		Patient's autonomy			
DM05	decisions regarding daily diabetes care should be made by the patient	Agree Don't know Disagree [1]	400 (89) 19 (4) 31 (7)	1.49 (.71–3.13) 2.31 (.67–7.99)	2.15 (1.19-3.88) *** 3.43 (1.05-11.22) ***
DM09	health care professionals should help patients make informed choices about their care plans.	Agree [1] Don't know Disagree	411 (91.3) 32 (7) 6 (1.3)	 1.23 (.57–2.66) .56 (.11–2.79)	
DM14	people with diabetes should have the final say in setting their blood glucose goals	Agree Don't know Disagree [1]	373 (83) 48 (11) 29 (6.4)	1.89 (1.43–2.48) *** 1.41 (1.00–1.99) ***	
DM19	the patient is important member of diabetes care team.	Agree [1] Don't know Disagree	417 (93) 25 (5.6) 8 (1.8)	 1.84 (1.50–2.25) *** 1.50 (.67–3.34)	
DM24	people with diabetes should learn a lot about the disease so they can oversee their own diabetes care.	Agree [1] Don't know Disagree	388 (86) 47 (10.4) 15 (3.3)	 1.47 (.82–2.64) 2.00 (.68–5.85)	
DM27	what the patient does has more effect on the outcome of diabetes care than anything a health professional does.	Agree [1] Don't know Disagree	382 (85) 48 (11) 20 (4.4)	 1.09 (.62–1.92) .67 (.27–1.63)	
DM30	people with diabetes have a right to decide how hard they will work to control blood sugar.	Agree Don't know Disagree [1]	403 (90) 25 (5.6) 22 (4.9)	1.81 (1.48–2.33) *** 1.50 (.67–3.34)	1.89 (1.50–2.38) ***
DM32	people with diabetes have the right not to take good care of their diabetes.	Agree Don't know Disagree [1]	94 (21) 32 (7) 324 (72)	1.61 (1.06–2.44) * 1.29 (.64–2.59)	

Notes: 1 = reference category; Results are indicated by binary logistic regression analysis and multivariate logit analysis. * p-value is significant when less than 0.05; P value < 0.05; (*<0.05, **<0.01, ***<0.001)

The indicators of diabetes mellitus history, physical activity, dietary habits, and nutritional status of patients demonstrated significant association with satisfaction about life with DM on binary logistic regression analysis. See Table 4 below for OR and 95%CI. The blank boxes indicate insignificant result on multivariate logit analysis. The patients who eat meal portions less than desirable amount have higher likelihood of being dissatisfied with their life with DM where AOR=1.82; 95%CI= 1.20-2.76.

Diabetes attitudes in association with satisfaction about life with DM

The dimensions of diabetes related attitudes were: need for special training of healthcare professionals (should be taught how daily diabetes care affects patients' lives, should be taught how daily diabetes care affects patients' lives, it is important for the nurses and dietitians who teach people with diabetes to learn counseling skills, should learn how to set goals with patients, not just tell them what to do, to do a good job, diabetes educators should learn a lot about being teachers). The patients' response as doubt or don't know to the five indicators of need for special training of healthcare professionals was found to have significant association on binary logistic regression analysis with satisfaction about life with DM. Majority of the patients answered 'yes' in response to the items of sub-scale 1 and very few responded as 'no' to the need for training of healthcare service providers. In multivariate analysis, *"it is important for the nurses and dietitians who teach people with diabetes to learn counseling skills"* not knowing/ doubt was significantly associated with higher likelihood of dissatisfaction about life with DM (AOR= 3.36; 95%CI= 1.40-8.01).

Seriousness of non-insulin dependent diabetes mellitus was depicted by scale items: people who do not need to take insulin to treat their diabetes have a mild disease, older people with Type 2 diabetes does not usually get complications, people whose diabetes is treated by just a diet do not have to worry about getting many long-term complications, blood sugar testing is not needed for people with Type 2 diabetes, Type 2 diabetes is a very serious disease, Type 2 is as serious as Type 1 diabetes and Patients on pills should be as concerned about their blood sugar as patients on insulin. On multivariate analysis, the patients who believed that the people who do not need to take insulin to treat their diabetes have a mild disease were more likely to have dissatisfaction about life with DM (AOR=1.56; 95%CI= 1.01-2.41). The patients who responded as don't know for Type 2 diabetes is a very serious disease were also more likely to be dissatisfied about life with DM (AOR=1.62; 95%CI= 1.09-2.04).

Value of tight control was assessed by response items: there is not much use in trying to have good blood sugar

Table 4. Life satisfaction in association with physical activity, dietary habits and attitudes

Variables	Satisfaction about life with DM	
	Positive/ Negative ^	Positive/ Negative #
	Exp (b) 95%CI Sig	Exp (b) 95%CI Sig
Which of these is a healthy body type?		
Thin		
Fat	1.94 (1.30–2.91) ***	
Normal / medium [1]	2.33 (1.07–5.10) ***	
Does healthy eating affect health positively?		
Yes [1]		
No	1.18 (.52–2.64)	
Do you eat healthy food to stay healthy?		
Yes [1]	2.05 (1.41–2.98) ***	
No		
Doctor ever told about importance of taking healthy diet?		
Yes [1]		
No	1.83 (1.35–2.47) ***	
Is exercise or physical activity part of your daily routine?		
Yes [1]		
No	1.74 (1.39–2.17) ***	
Portion per meal		
Less than desirable	1.93 (1.54–2.44) ***	1.82(1.20–2.76) **
More than desirable	1.53 (.96–2.31)	
Normal [1]		
Diagnosis of anemia		
Yes	1.47 (1.02–2.11) *	
No [1]		

Notes: 1 Reference category; ^ Results of binary log analysis; # Results of multivariate analysis. The table indicates the variables found significant in binary logistic regression and multivariate logistic analysis. P value < 0.05; (*<0.05, **<0.01, ***<0.001)

control because complications of diabetes happen anyway, the blood sugar close to normal can help to prevent the complications of diabetes, diabetes patient should do whatever it takes to keep their blood sugar close to normal, low blood sugar reactions make tight control too risky for most people, Type 2 diabetes patients will probably not get much payoff from tight control of their blood sugars, tight control is too much work and tight control of blood sugar makes sense only for people with Type 1 diabetes.

Patients of the view that there is not much use in trying to have good blood sugar control because complications of diabetes happen anyway have higher likelihood of life dissatisfaction (AOR= 1.63; 95%CI= 1.18-2.23) and Type 2 diabetes patients will probably not get much payoff from tight control of their blood sugars have higher likelihood of life dissatisfaction (AOR=1.53; 95%CI= 1.04-2.26). Ignorance and undecided patients have overall significant high risk of having life dissatisfaction with DM.

Psycho-social impact of diabetes on patients is assessed by: diabetes affects every part of a diabetic person's life, the emotional effects of diabetes are small, diabetes is hard because you never get a break from it, having diabetes changes a person's outlook on life, frustrating for people with diabetes to take care of their disease and support from family and friends is important in dealing with diabetes. In multivariate analysis, the patients who think that the emotional effects of diabetes are small have higher likelihood of satisfaction about life with DM (AOR=1.47; 95%CI= 1.02-2.14). And ignorant patients in this regard have higher likelihood of outcome (AOR=1.87; 95%CI=1.11-3.14) (See Table 3).

Patient's autonomy was indicated with decisions regarding daily diabetes care should be made by the patient, professionals should help patients make informed choices about their care plans, people with diabetes should have the final say in setting their blood glucose goals, the patient is important member of diabetes care team. people with diabetes should learn a lot about the disease so they can oversee their own diabetes care, people with diabetes have a right to decide how hard they will work to control blood sugar, and people with diabetes have the right not to take good care of their diabetes. The patients who believe that the decisions regarding daily diabetes care should be made by the patient have higher odds of dissatisfaction with AOR= 2.15 and 95%CI= (1.19-3.88). The undecided patients in this regard have 3.43 times higher likelihood of life dissatisfaction (95%CI=1.05-11.22).

Undesirable phenomena

Since, present study was a cross-sectional survey assessing satisfaction, attitudes and practices; undesirable medical events did not emerge at any stage of data collection.

DISCUSSION

The purpose of this study is to analyze the patient satisfaction about life with diabetes mellitus in association with disease management and nutritional status. Overall, 64% of the patients interviewed reported dissatisfaction with their life with DM. Overall, 66 percent of the patients interviewed were females. Most of the patients were obese (56%) with BMI value above 25.0. The patients who eat meal portions less than desirable amount have higher likelihood of being dissatisfied with their life with DM. This is perhaps associated with the poverty and malnutrition of diabetic patients [3, 6]. Results indicated that the gender, and low and middle income of families were significantly associated with life satisfaction. Regarding the importance of learning patient counselling skills for the nurses and dietitians who teach people with diabetes, doubt was significantly associated with higher likelihood of dissatisfaction about life with DM. Previous studies have also demonstrated that patients think that the healthcare providers for DM patients should develop counselling and condoling skills.

The patients who believed that the people who do not need to take insulin to treat their diabetes have a mild disease were more likely to have dissatisfaction about life with DM. Patients of the view that there is not much use in trying to have good blood sugar control because complications of diabetes happen anyway have higher likelihood of life dissatisfaction. Likewise, studies have demonstrated that the diabetes related worries were common among patients worldwide [13].

Ignorant and undecided patients have overall significant high risk of having life dissatisfaction with DM. Cultural anatomy, poverty, education and language affects the patient's life perspective, health awareness and diabetes self-management [14]. Similar studies conducted on the diabetes management attitudes in India [5] and Bangladesh [12]; the countries which have similar health context, revealed similar findings as this study. Intervention researches have highlighted the importance of patient education in reducing the morbidity and mortality of diabetes [15].

Due to widespread poverty in the country, majority of public is unable to understand the disease implications and medical terminology [16]. Diet therapies are useful for the treatment of many medical problems including both types of diabetes and essential supplement to insulin therapy in young diabetics. The main purpose of diet therapy is to restore and maintain the blood sugar within the normal range. And secondly, to provide an adequate supply of essential nutrients to the body. Particularly the nutrients that are necessary for the normal growth and tissue development. Numerous researches have shown that the diabetes can be managed well by the management of diet and proper intake of diet [17].

There is consensus among doctors and dietitians that the dietary management is of great importance for control of blood sugar level. The motivation of patient is also required for the diet-based management of diabetes.

Counselling sessions led by nutritionist and dietitian are helpful in keeping the patients informed about their health status, lifestyle and any laboratory reports. To improve the psycho-social and health outcomes of diabetes mellitus patients, the doctors and nutritionists should be trained to provide anticipatory guidance to the patients. Subsidized training programs that target health professionals and DM patients would help improving health related outcomes [18].

Research limitations and strengths

The cross-sectional study design, small sample size, and length of questionnaire were the primary weaknesses. The lack of financial support and availability of time were also significant limitations. One strength of this study is the use of quality control approaches such as thorough training of investigators in data collection and data analysis. We used DAS-3 in the first part of this study as it covers maximum aspects of DM patient's life. It has been tested and proved useful instrument with broad range of dimensions to assess the attitudes of patient as well as healthcare providers. The use of internationally tested and validated tool helped in generating evidence-based findings covering almost all aspects of DM patient's life satisfaction [19, 20]. The life satisfaction of diabetes mellitus patients in association with the disease management attitudes and nutritional status was never investigated before in Pakistani administered Azad Jammu & Kashmir.

CONCLUSION

The results implied that the life satisfaction with diabetes mellitus was significantly associated with the disease management attitudes (Need of counselling skills for nurses and dietitians who teach diabetes patients, patients not taking insulin have slight disease, type II DM is serious disease, having good blood sugar control is useless because complications of diabetes happen anyway, Type 2 diabetes patients don't get much payoff from tight control, emotional effects of diabetes are small; and decisions of daily diabetes care should be made by the patient) and nutritional status (per meal portion size) of the patients. The likelihood of life satisfaction was low for male gender and lower family income. Interventions promoting health resilience and self-management among DM patients can act as a useful tool to equip the individuals with self-control as well as a positive attitude towards life with DM.

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ИНФОРМАЦИЯ ОБ АВТОРАХ [AUTHORS INFO]

***Aisha Jalil**, PhD, assistant professor; address: School of Integrated Social Sciences, University of Lahore, 54770, Pakistan; ORCID: https://orcid.org/0000-0002-2935-4756; e-mail: aisha.jalil@siss.uol.edu.pk

Ahmed Usman; PhD, assistant professor; ORCID: https://orcid.org/0000-0003-2844-7456; e-mail: ahmedusmaan@hotmail.com
Sobia Akram, MSc. Home Economics, lecturer; ORCID: https://orcid.org/0000-0002-6078-2564; e-mail: sobia.akram@must.edu.pk
Nazish Zulfiqar, M Phil. Food and Nutrition, lecturer; ORCID: https://orcid.org/0000-0001-7533-5647; e-mail: nazish.he@must.edu.pk
Wajeeha Arshad, MSc, assistant professor; ORCID: https://orcid.org/0000-0002-2239-1570; e-mail: chairperson.he@must.edu.pk

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