Original Paper

Health-related quality of life in acute myeloid leukaemia and multiple myeloma survivors undergoing autologous progenitor stem cell transplantation: a retrospective analysis

Authors' Contribution:
A Study Design
B Data Collection
C Statistical Analysis
D Data Interpretation
E Manuscript Preparation
F Literature Search
G Funds Collection

Ladislav Slovacek[1,2][ABCDE], **Birgita Slovackova**[3][ABCD], **Vladimir Pavlik**[4][DEFG], **Ladislav Jebavy**[1,5][DEFG]

[1] Department of Field Internal Medicine, Faculty of Military Health Sciences, University of Defence, Hradec Kralove, Czech Republic
[2] Department of Clinical Oncology and Radiotherapy, Charles University Hospital and Faculty of Medicine, Hradec Kralove, Czech Republic
[3] Department of Psychiatry, Charles University Hospital and Faculty of Medicine, Hradec Kralove, Czech Republic
[4] Department of Hygiene, Faculty of Military Health Sciences, University of Defence, Hradec Kralove, Czech Republic
[5] Department of Clinical Haematology, 2nd Internal Clinic of Charles University Hospital and Faculty of Medicine, Hradec Kralove, Czech Republic

Summary

Background

Haematopoietic stem cell transplantation (HSCT) is a specific therapeutic method used for biomodulation antitumour therapy of haematological malignancies and of solid tumours. It is also used for the therapy of non-tumour and hereditary diseases.

Aim

To analyse the selected psychosocial, health and demographic aspects of quality of life (QoL) in acute myeloid leukaemia (AML) and multiple myeloma (MM) survivors undergoing autologous progenitor stem cell transplantation (PSCT).

Materials/Methods

The total number of AML survivors was 12 (7 male, 5 female). The total number of MM survivors was 32 (18 male, 14 female). The average age of AML survivors was 47.5 years old. Average age of MM survivors was 60 years old. The Czech version of the international generic European Quality of Life Questionnaire, Version EQ-5D, was used. The effect of selected psychosocial, health and demographic aspects of QoL was determined by means of analysis of variance. The descriptive analysis was used for evaluation of QoL questionnaires.

Results

The above-mentioned aspects proved statistically significant dependence of QoL (EQ-5D score and EQ-5D VAS) on age in both cohorts ($p<0.01$), religion in AML cohort ($p<0.05$), smoking abuse in both cohorts ($p<0.01$), level of education in AML cohort ($p<0.05$), increasing number of associated diseases in both cohorts ($p<0.05$) and type of disease ($p<0.05$). Global QoL in AML survivors is at a much higher level than in MM survivors undergoing autologous PSCT.

Conclusions

Low QoL correlates with increasing age of survivors treated with autologous PSCT. QoL in survivors who underwent autologous PSCT and believed in God was higher than in survivors who were non-believers. Low QoL correlates with

smoking abuse. In both cohorts of survivors we proved lower QoL in smokers in comparison with non-smokers or former smokers. Low QoL in AML survivors with low level of education, meaning survivors with elementary and apprentice level education, has been proved. Low QoL correlates with increasing number of associated diseases in both cohorts of survivors.

Author's address: Ladislav Slovacek, Department of Field Internal Medicine, Faculty of Military Health Sciences, University of Defence, 1575 Trebesska Street, 500 01 Hradec Kralove, Czech Republic, e-mail: ladislav.slovacek@seznam.cz

BACKGROUND

QoL is defined as "a patient's subjective evaluation of his life situation" [1,2]. The QoL term contains the information of an individual's physical, psychological, social and spiritual condition [1–4]. QoL evaluation is carried out by means of generic and specific questionnaires. Generic QoL questionnaires generally evaluate a patient's overall condition regardless of his disease. Specific QoL questionnaires are designed for the evaluation of a patient's overall condition in a particular type of disease. Modules are often used with these specific questionnaires. These modules are focused on specific symptoms and complaints in a particular type of disease [1–4].

Haematopoietic stem cell transplantation (HSCT) is a specific therapeutic method used for biomodulation antitumour therapy of haematological malignancies and of solid tumours. It is also used for therapy of non-tumour and hereditary diseases [5]. It is divided into: bone marrow transplantation (BMT), transplantation of stem (progenitor) cells (PSCT), and umbilical cord blood transplantation (UCBT) [5–7]. From a donor's point of view there are three kinds of HSCT: syngenic transplantation (the donor is a monozygotic twin), allogeneic HSCT (HLA from a compatible sibling or parent or HLA from a compatible donor), autologous HSCT (the patient himself is the donor). The aim of HSCT is to replace a patient's pathological bone marrow which contains tumorous cells with haematopoietic cells from a healthy donor and to restore hematopoiesis which is damaged by intensive antitumour therapy [5–7].

The aim of the current QoL study was to analyse the effects of selected psychosocial, health and demographic aspects on QoL in acute myeloid leukaemia (AML) and multiple myeloma (MM) survivors undergoing autologous PSCT and to evaluate global QoL in AML and MM survivors undergoing autologous PSCT.

Design of Study

The study is cross-sectional and retrospective and it is based on data obtained during the year 2004/2005 (from September 1, 2004 to January 31, 2005) in 12 AML survivors and 32 MM survivors undergoing autologous PSCT between 2001 and 2003 at the Department of Clinical Haematology of the 2nd Internal Clinic of Charles University Hospital and Faculty of Medicine in Hradec Kralove, Czech Republic.

Study Population

The total number of AML survivors undergoing autologous PSCT was 12 (7 male, 5 female). The average age of AML survivors was 47.5 years old (range 27–68 years old). The total number of MM survivors undergoing autologous PSCT was 32 (18 male, 14 female). The average age of MM survivors was 60 years old (range 45–78 years old).

QoL Questionnaire

The Czech version of the international generic EuroQol EQ-5D Questionnaire was used in the study [1]. This questionnaire evaluates 2 indicators, objective and subjective indicators. The

objective indicator includes 5 dimensions of QoL: mobility, self-care, usual activities, pain/discomfort, anxiety / depression [1,8,9]. Three kinds of answers which express the degree of complaints are offered to each question (no complaints, mild complaints, severe complaints). In total there are 243 (3^5) combinations of health condition. The outcome is the EQ-5D score (dimensions of QoL), which has values from 0 to 1 (0 – the worst health condition, 1 – the best health condition). The subjective indicator uses a visual analogous scale (value of 100 – the best health condition, value of 0 – the worst health condition). The respondent marks his subjectively perceived health condition on the thermometer scale. The outcome is EQ-5D VAS (subjective health condition), which has values from 0 to 100 [1,8,9].

Data collection, statistical analysis

The independent variables were age, sex, level of education, marital status, increasing number of associated diseases, smoking abuse, religion, type of disease and time lapse from autologous PSCT. The dependent variables were EQ-5D score (dimensions of QoL) and EQ-5D VAS (subjective health condition). The evaluation of questionnaires was carried out by means of descriptive analysis in accordance with the European Quality of Life Group Method (1,9). The effect of selected aspects of QoL of patients was evaluated by means of analysis of variance (ANOVA). StatSoft STATISTICA Base 7.1 software was used for complete evaluation of data. The value $p<0.05$ was considered significant.

Procedure

The QoL questionnaire and a covering letter in which the whole project was explained, together with a stamped envelope, were mailed to the respondent's address. Completion of the questionnaire was voluntary and anonymous.

Results

The above-mentioned aspects proved statistically significant dependence of QoL (EQ-5D score and EQ-5D VAS) on age in both cohorts ($p<0.01$) (Table 1 and Figure 1), religion in AML cohort ($p<0.05$) (Table 2), smoking abuse in both cohorts ($p<0.01$) (Table 3 and Figure 2), level of education in AML cohort ($p<0.05$) (Table 4), increasing number of associated diseases in AML cohort ($p<0.05$) (Table 5) and type of disease ($p<0.05$) (Table 6). The effect of other aspects of QoL was not proven as statistically significant.

The global QoL in patients with AML undergoing autologous PSCT is at a much higher level (mean EQ-5D score was 75.1%, mean EQ-5D VAS was 67.5%) than in patients with MM undergoing autologous PSCT (mean EQ-5D score 68.9%, mean EQ-5D VAS 66.6%).

Discussion of results

Five main outcomes follow from our study:

1. The effect of age on QoL in AML and MM survivors undergoing autologous PSCT has been proved.

Our results show that a lower QoL correlates with increasing age of patients treated by means of autologous PSCT. De Souza [10], Heinonen [11,12], Chiodi [13], Wang [14], Wong [15], Andrykowski [16] and Zittoun [17] discovered a similar trend in their studies. De Souza [14] points out in his longitudinal study conducted in a group of 26 patients who underwent bone marrow transplantation and peripheral stem cell transplantation lower QoL of these patients. De Souza [10] further explained his statements by the fact that with increasing age a number of associated diseases can occur (polymorbidity). These diseases reduce QoL. Choidi [13] also agrees with this opinion in his cross-sectional study conducted in a group of 244 patients with haematological malignancies who underwent allogeneic BMT. Choidi [13] also points out the fact that in addition to polymorbidity a negative influence of cGVHD on lower QoL in patients with increasing age should be stressed. Wang [14], Wong [15] and Andrykowski [16] also agree with the influence of cGVHD on lower QoL of patients with increasing age. Zittoun [17] discovered another interesting piece of information in his cross-sectional study conducted in a group of 179 patients with haematological malignancies who underwent HSCT. He [17] points out that increasing overall fatigue and emotional complaints which decrease QoL correlate with increasing age. So [18] also discovered an interesting piece of information in his cross-sectional study conducted in a group of 157 patients with haematological malignancies who underwent BMT. He [18] proved a high degree of overall fatigue in patients over the age of 50 with associated diseases. Another author who agrees with Zittoun's [17] and So's [18] opinions is Saleh [19]. He [19] conducted a transversal study in a group of 41 patients who underwent BMT. This author points out that in patients with an increasing number of associated

Table 1. Comparison of mean EQ-5D score and EQ-5D VAS values in individual age groups in AML survivors (n=12, p<0.01).

Age range	Number of respondents	Mean EQ-5D Score (in %)	Standard deviation	Mean EQ-5D VAS (in%)	Standard deviation
20—29	1	**70**	0	**60**	0
30—39	1	**98**	0	**95**	0
40—49	5	**86.2**	15.7	**73.6**	13.9
50—59	3	**60**	14.5	**58.3**	2.4
60—69	2	**61**	15	**56**	4

	20—29 (0)	30—39 (0)	40—49 (2)	50—59 (13)	60—69 (13)	70—79 (4)
EQ-5D score	0	0	81.5	74.2	64.2	61.5
EQ-5D VAS	0	0	77.5	67.3	60.4	71.2

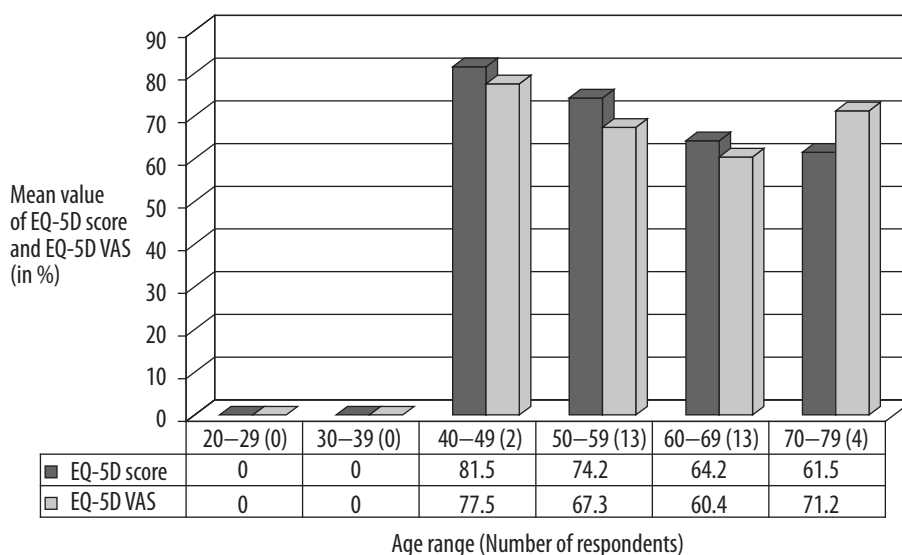Age range (Number of respondents)

Figure 1. Dependence of EQ-5D score and EQ-5D VAS on individual age groups in MM survivors (n=32, p<0.01).

Table 2. Comparison of mean EQ-5D score and EQ-5D VAS values with religion in AML survivors (n=12, p<0.05).

Religion	Number of respondents	Mean EQ-5D Score (in %)	Standard deviation	Mean EQ-5D VAS (in %)	Standard deviation
Believers	8	**83.9**	15.9	**71**	16.6
Non-believers	4	**57.5**	17.6	**60.5**	10.2

Table 3. Comparison of mean EQ-5D score and EQ-5D VAS values with smoking abuse in AML survivors (n=12, p<0.01).

Smoking abuse	Number of respondents	Mean EQ-5D Score (in %)	Standard deviation	Mean EQ-5D VAS (in %)	Standard deviation
Non-smokers	6	**90.7**	11.4	**77.2**	16.4
Smokers	6	**59.5**	14.1	**57.8**	3.5

	Non-smokers (15)	Former smokers (9)	Smokers (8)
■ EQ-5D score	0	0	81.5
□ EQ-5D VAS	0	0	77.5

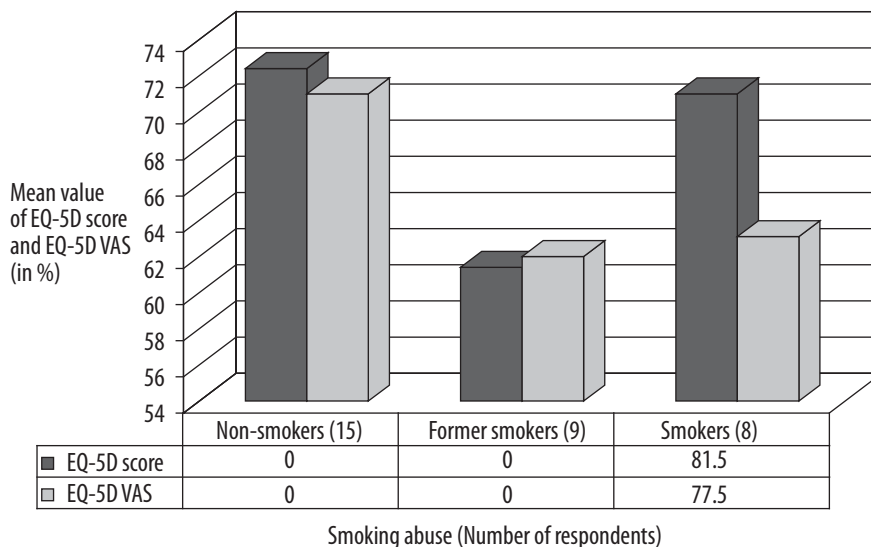Smoking abuse (Number of respondents)

Figure 2. Dependence of EQ-5D score and EQ-5D VAS on smoking abuse in MM survivors (n=32, p<0.01).

Table 4. Comparison of mean EQ-5D score and EQ-5D VAS values with level of education in AML survivors (n=12, p<0.05).

Level of education	Number of respondents	Mean EQ-5D Score (in %)	Standard deviation	Mean EQ-5D VAS (in %)	Standard deviation
Elementary	2	43	4.2	53.5	2.12
Apprentice	3	67	8.5	60	0
Secondary	3	74	4.0	65	8.7
University	4	98	0	82	17.9

Table 5. Comparison of mean EQ-5D score and EQ-5D VAS values with increasing number of associated diseases in AML survivors (n=12, p<0.05).

Number of disease	Number of respondents	Mean EQ-5D Score (in %)	Standard deviation	Mean EQ-5D VAS (in %)	Standard deviation
0	3	88.7	16.2	71.7	20.2
1	4	83.2	18.7	77	15.7
2	4	64	16.6	58.8	2.5
3 and more	1	46	0	52	0

diseases there is a lower overall physical condition, and this means lower QoL [19].

2. The effect of religion on QoL in AML survivors undergoing autologous PSCT has been proved.

It is clear from our results that QoL in patients who underwent autologous PSCT and believed in God was higher than in patients who were non-believers. According to Pospisilova [20], real QoL is associated with spiritual growth of a human being. This means real inner wealth which nobody can give to or take from another person. Creative values and values concerning experience and attitudes are also important. These values are according to Pospisilova [20] virtues in Christian tradition. Bach [21] recorded these changes in values in patients who

Table 6. Comparison of AML and MM survivors according to the level of troubles and the type of disease (n=44, p<0.05).

Dimension of QoL	Level of evaluation	AML		MM	
Number of respondents		*abs.*	*rel*	*abs.*	*rel.*
Mobility	no troubles	10	83.3%	13	41%
	with troubles	2	16.7%	19	59%
	immobile	0		0	
Self-care	no troubles	10	83.3%	26	81.2%
	with troubles	2	16.7%	6	18.8%
	incapable	0		0	
Usual activities	no troubles	9	75%	6	18.8%
	with troubles	3	25%	26	81.2%
	incapable	0		0	
Pain/discomfort	none	10	83.3%	9	28.1%
	substantial	2	16.7%	22	68.8%
	extreme	0		1	3.1%
Anxiety/depression	none	9	75%	13	41%
	substantial	2	16.6%	19	59%
	extreme	1	8.4%	0	
Number of respondents		*12*		*32*	

underwent BMT. The above-mentioned changes often mean that the patient has to stop various activities, including his interests and hobbies [21]. Boyd [22] proved significant changes in patients who underwent HSCT and believed in God. Patients who believed in God had a higher QoL than non-believers [22].

3. The effect of smoking abuse on QoL in AML and MM survivors undergoing autologous PSCT has been proved.

In both cohorts of patients we proved lower QoL in smokers in comparison with non-smokers or former smokers. Chang [23] found an opposite trend in his longitudinal follow-up of patients with chronic myeloid leukaemia following allogeneic HSCT, in whom the effect of alcohol and smoking abuse on quality of life was studied. The group consisted of 114 patients. The author did not prove in his study any effect of alcohol or smoking abuse on QoL in this group of patients [23].

4. The effect of level of education on QoL in AML survivors undergoing autologous PSCT has been proved.

Henoinen [11,12] points out in his longitudinal study conducted in a group of 109 patients who underwent allogeneic BMT a higher QoL in patients with secondary and university education. Andrykowski [16] arrived at a similar conclusion in his multicentre longitudinal study conducted in a group of 200 patients with haematooncological diseases who underwent BMT. He [16] proved a lower QoL in patients with lower education, meaning patients with elementary and apprentice education.

5. The effect of increasing number of associated diseases on QoL in AML survivors undergoing autologous PSCT has been proved.

Our results show that lower QoL correlates with increasing number of associated diseases. Our results agree with the results of significant studies conducted by De Souza [10] and Chiodi [13]. Zittoun [17] discovered an interesting piece of information which showed a correlation among increasing number of associated diseases, overall fatigue and emotional difficulties. Another scientist who agreed with this opinion was So [18] in his cross-sectional study conducted in a group of 157 patients with haematological malignancies

who underwent BMT. He [18] proved a high degree of overall fatigue in patients over the age of 50 with associated diseases. Saleh [19] also agrees in his cross-sectional study conducted in a group of 41 patients who underwent BMT with Zittoun's [17] and So's [18] opinions. This author [19] stresses the fact that in patients with an increasing number of associated diseases there is lower overall physical fitness and this causes a lower QoL. Heinonen [11,12] recorded in his longitudinal study conducted in a group of 109 patients who underwent allogeneic BMT a lower QoL in patients in connection with increasing number of associated diseases, increased morbidity, increasing overall fatigue and worse quality of sleep. When he compared polymorbid men and women who underwent allogeneic BMT he discovered a lower QoL in women [11,12].

CONCLUSIONS

It is common in clinical practice to evaluate a patient's health condition and the success of the treatment based only on one type of markers, most often by means of somatic, laboratory or detecting markers [1,2,25]. But the trend in modern medicine is to evaluate a patient's health condition in a more complex way, using other aspects. QoL means a higher dimensional evaluation of a number of life aspects. Different aspects can be affected in a different way in different phases of the disease and its treatment [1,2]. That is why this information enriches our knowledge concerning a patient's needs, and it can significantly contribute to improvement in medical treatment. It can also help us to reveal the mechanisms which modify the origin and the course of disease [1,2,24–27].

We are aware of the fact that our study may be limited by a few factors: 1. The cross-sectional type of the study informs us only about the QoL in AML and MM survivors at a certain time undergoing autologous PSCT and it does not show the developmental trend. 2. The study deals only with the influence of selected aspects of QoL. We could add a few other factors. But we decided on these factors because patients were able and willing to provide this information in a retrospectively and anonymously carried out study. 3. The small group of AML survivors undergoing autologous PSCT.

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