

The Influence of Religiosity and Spirituality on the Quality of Life of Patients With Multiple Myeloma

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Abstract

The aim of the study was to assess the influence of religiousness and spirituality (R/S) on the quality of life (QoL) of patients with multiple myeloma (MM). A total of 83 patients were examined. Interest in R/S issues was dependent on disease phase. The type of R/S coping affected health-related QoL. Addressing R/S issues within hospital care would be beneficial for MM patients.

Introduction: The majority of patients with advanced neoplasms have religious/spiritual needs, and for most of them religion and/or spirituality is important. The psychology of religion and spirituality is one of the forms of support offered to patients with advanced cancer. R/S are factors which impact health-related quality of life (HRQoL). The aim of this paper was to assess the influence of R/S on the HRQoL of patients diagnosed with MM. **Materials and Methods:** The patients filled out anonymous questionnaires about R/S and the HRQoL scale. The clinical data were collected from medical records. **Results:** The study sample consisted of 83 patients with MM (51.8% women), with a mean age of 64.9 years. The leading denomination among the respondents was Catholic (N = 83, 100%): 36% described themselves as deep believers (N = 30), 53% as believers (N = 44), and 11% as nonpracticing believers (N = 9). Most patients were receiving ongoing treatment (59.8%), while 40.2% were in remission from the disease. Patients in remission declared a significantly higher interest in R/S issues than patients in active treatment and had a higher rate of intrapsychic R/S struggles dominated by anxiety and guilt. A moderate negative correlation between interest in R/S issues and unfavorable assessment of physical functioning and role functioning was observed. Anger towards God positively correlated with a negative assessment of emotional functioning. **Conclusions:** The findings highlight the importance of R/S for the HRQoL of MM patients and show that their QoL depends on the types of R/S coping used.

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Introduction

The relevance of religion and spirituality for medicine is nowhere clearer than in the care of seriously ill and dying patients.¹ Today, cancer is the second most prevalent disease and the leading cause of death after cardiovascular disease. Epidemiological projections

indicate that cancer is expected to become the most common cause of mortality worldwide in the next few decades. The consequence is an increasing demand for the development of medical care, but also the need for research in the fields of medicine and health psychology in cancer patients.²

Multiple myeloma (MM) is a hematological malignancy characterized by the uncontrolled expansion of abnormal plasma cells in the bone marrow and the production of monoclonal immunoglobulin.³ MM accounts for about 1% of all cancers worldwide and 10% to 15% of all hematological malignancies; thus, it is the second most common hematologic neoplasm globally. The median age of diagnosis is 65 to 70 years.³ The most common symptoms are nonspecific, such as bone pain, fatigue and, in rare cases, weight loss. Clinical presentation includes CRAB symptoms: hypercalcemia, renal

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failure, anemia, and bone pain.⁴ Overall survival and progression-free survival are estimated based on the Revised International Staging System (R-ISS), which comprises serum biomarker levels and chromosomal abnormalities.⁵ The standard treatment includes pharmacotherapy, followed by autologous hematopoietic stem cell transplantation.⁴ In recent years, several new pharmaceuticals have been developed and survival of MM patients has improved significantly.⁴ Nevertheless, MM remains a chronic, incurable disease with periods of remission and relapse. Symptoms experienced by patients are burdensome and significantly affect their quality of life (QoL). Additionally, the QoL of MM patients may be impaired by comorbidities, especially since MM most commonly affects elderly people with concomitant chronic diseases.⁶

MM, like other cancers, is a category of physical conditions in which the contribution of stress-related psychological factors is enormous. Cancer is a very stressful life event that triggers a wide spectrum of reactions that determine thinking, emotion regulation, and behavioral mechanisms at different stages of its diagnosis and treatment. It not only threatens life but also significantly destabilizes and blocks human aspirations and goals, forces modifications to temporal lifestyles, restricts the performance of social roles, and disrupts interpersonal relationships. Therefore, it is not surprising that a person with this illness activates a range of coping strategies aimed at managing the aggravating demands of the illness and reducing the negative emotional states experienced. In this perspective, understanding the process of coping with cancer is a fundamental task of health psychology.²

QoL has been defined by the World Health Organization as an "individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns."⁷ Health-related quality of life (HRQoL) refers to aspects of QoL that are relevant to health and are affected by health status. HRQoL describes the physical, role, emotional, cognitive, and social aspects of functioning. In this context, HRQoL is 1 aspect of QoL.⁸

HRQoL in multiple myeloma (MM) has been the subject of many studies.^{6,9-14} According to a theoretical HRQoL model of people with MM, spirituality is a specific area that constitutes their QoL.⁹ The majority of people with advanced neoplasm have spiritual needs (91%, according to Pearce et al.¹⁵), and for most of them religion is important. When patients' spiritual needs are fulfilled by health care professionals, this is correlated with higher satisfaction with medical care, better quality of life, and lower severity of depression symptoms.^{15,16} Meaning-based religious or spiritual factors enable the discovery of purpose and meaning in life in the context of mental health and are associated with psychological well-being in cancer patients. Meaning-based R/S factors are also present in reactions to stressful situations and unexpected events that the individual finds difficult to cope with, eg, suffering and illness.^{2,17}

Objective of the Study

The beneficial but also detrimental effects of religious/spiritual factors on health have been confirmed by a number of empirical studies in the psychology of religion and health.¹ The obtained results indicate, on the 1 hand, the complexity and cognitive appeal

of the role of religion and spirituality in individual functioning; on the other hand, they encourage the development of such research explorations. Since religiosity and spirituality in the population of patients with MM has so far been explored in a limited way, the aim of this paper was to assess the influence of both of them on the HRQoL of patients diagnosed with MM.

Because the vast majority of individuals (~65%-85%) in the general population in countries where religion still plays significant public role identify as either spiritual and religious or neither spiritual nor religious¹⁸ (as is also the case in Poland^{19,20}), it can be said that spirituality and religion overlap considerably from an empirical standpoint.¹⁸ Given that spirituality and religion are so closely related in the Polish population as well among oncology patients in this country,² and following Pargament's conceptualization of the relationship between the 2,²¹ we combine them as a *religiosity-spirituality* (R/S) variable for our research, in accordance with the survey instruments which have been applied in this study.

Materials and Methods

After obtaining the consent of the Bioethics Committee (approval number: 1072.6120.64.2022), the study was carried out at the Department of Hematology of Jagiellonian University Medical College (JUMC) between April and August in 2022. Participants filled out anonymous questionnaires. Inclusion criteria included diagnosis of plasma cell myeloma and identification as a spiritual person, as expressed in a questionnaire. People who did not identify themselves as religious and/or spiritual were excluded from the research as the instruments used in the surveys (see Supplementary Material) were standardized for R/S respondents. Representatives of all denominations were allowed to participate in the study. Informed consent was obtained from all study participants.

The study sample consisted of 83 patients with MM (43 women-51.8%). The mean age was 64.9 years (SD: 10.7, range: 36-94). Most of the respondents declared higher education (N = 36, 43.4%). The most frequently indicated place of residence was villages (N = 35, 42.2%). The study involved 53 annuitants (63.9%), 14 pensioners (16.8%) and 16 professionally active people (19.3%). The leading denomination among the respondents was Catholicism (N = 83, 100%), of which 36% described themselves as deep believers (N = 30), 53% as believers (N = 44), and 11% as non-practicing believers (N = 9). Sociodemographic data are shown in Table 1.

The diagnosis of MM was established less than 12 months before the commencement of our study in 18 respondents (21.7%), from 1 to 5 years in 34 respondents (41.0%), and more than 5 years in 31 respondents (37.3%). Autologous stem cell transplantation (ASCT) had been performed in 65% of patients (N = 54). In 61% (N = 33) of them, the transplant procedure had been performed twice. Coexisting neoplasms had occurred in 4 patients (4.8%). 41% (N = 34) of the study participants were diagnosed with stage 1 myeloma, according to the International Staging System (ISS). 12.0% (N = 10) of patients presented with high cytogenetics risk. 19.3% (N = 16) of patients had undergone radiotherapy. The features of osteolysis and/or pathologic fractures were observed in more than half of the evaluated patients (N = 44, 53.0%). Most

Table 1 Demographics of the Respondents (N = 83)

		N	% of Total	Cumulative %
Sex	Woman	43	51.8%	51.8%
	Man	40	48.2%	100%
Age	36-50	10	12.1%	12.1%
	51-60	16	19.3%	31.4%
	61-70	31	37.3%	68.7%
	71-80	22	26.5%	95.2%
	81-94	4	4.8%	100%
Residence	City of more than 500,000 residents	27	32.5%	32.5%
	City of 100,000-250,000 residents	4	4.8%	37.3%
	City of 50,000-100,000 residents	2	2.4%	39.7%
	City up to 50,000 residents	15	18.1%	57.8%
Education level	Village	35	42.2%	100%
	Higher	36	43.4%	43.4%
	Secondary	23	27.7%	71.1%
	Vocational	17	20.5%	91.6%
	Incomplete Higher	5	6.0%	97.6%
	Elementary	2	2.4%	100%
Job status	Pensioner	53	63.9%	63.9%
	Active	16	19.3%	83.2%
	Annuitant	14	16.8%	100%
Denomination	Catholicism	83	100%	100%
Level of religiosity	Believer	44	53.0%	53.0%
	Deep believer	30	36.1%	89.1%
	Non-practicing believer	9	10.8%	100%

patients were being actively treated (N = 49, 59.8%), while 33 (40.2%) were in remission from the disease. The clinical data were collected from the medical records of patients treated at JUMC Hematology Department and are shown in Table 2.

In the evaluation of religiosity and spirituality, 6 instruments were used:

- Centrality of Religiosity Scale by S. Huber (Polish adaptation by B. Zarzycka).²²
- Emotions-toward-God Scale by S. Huber (Polish adaptation by B. Zarzycka and R. Bartczuk).²³
- Attachment to God Questionnaire by W. Matys and R. Bartczuk.²⁴
- Brief R-cope Scale (brief version) by K. Pargament (Polish adaptation by E. Talik).²⁵
- The Religious Comfort and Strain Scale by J. Exline (Polish adaptation by B. Zarzycka).²⁶
- Changing of Beliefs and Goals in the Illness Scale by D. Krok (2017).²

In the evaluation of QoL, the QLQ-C30 Quality of Life Assessment Questionnaire (Polish adaptation by Majkowicz and de Walden-Gałaszko)²⁷ was used.

Descriptions of the instruments used in the study can be found in the appendices.

All statistical analyses were performed in R software²⁸ using the psych package.²⁹

Results

In our study, patients in remission declared a significantly higher interest in religious issues than patients in active treatment ($t = 3.672, P < .001, P = .827$) (Figure 1).

Similarly, patients in remission had a higher rate of intrapsychic spiritual struggles that were dominated by anxiety and guilt than patients in active treatment ($t = 2.187, P < .05, d = 0.492$) (Figure 2).

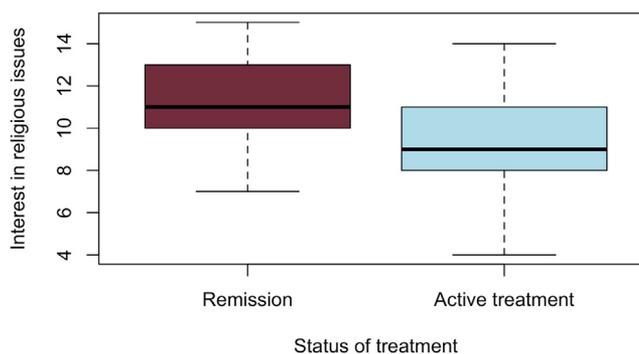
In the study group, the following correlations of psychological variables were observed (Table 3):

- A moderate negative correlation between interest in religious issues and unfavorable assessment of physical functioning ($r = 0.321, P < .01$) and role functioning ($r = 0.349, P < .01$).
- A moderate positive correlation between anger towards God and the assessment of emotional functioning ($r = 0.366, P < .001$). This means that anger towards God positively correlated with a negative assessment of emotional functioning.
- A moderate positive correlation between negative religious coping methods and dysfunctional changes of beliefs as a result of the illness ($r = 0.332, P < .01$). With the aim of perceiving and understanding a difficult situation, an individual's cognitive processes occur at 2 fundamental levels: the overall meaning and the meaning of the situation. When there is a discrepancy between these 2, the distress associated with a problematic situa-

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Table 2 Clinical Data on Diagnosis and Treatment of MM in the Sample (N = 83)

		N	% of Total	Cumulative %
Diagnosis of multiple myeloma	< 12 mo	18	21.7%	21.7%
	1-5 y	34	41.0%	62.7%
	> 5 y	31	37.3%	100%
Marrow transplantation	Yes	54	65.1%	65.1%
	No	29	34.9%	100%
Count of marrow transplantation	1	21	38.9%	38.9%
	2	33	61.1%	100%
Presence of secondary/coexisting cancers	Yes	4	4.8%	4.8%
	No	79	95.2%	100%
Myeloma staging assessment (ISS)	Stage 1	34	41.0%	41.0%
	Stage 2	13	15.7%	56.6%
	Stage 3	10	12.0%	68.7%
	Unknown	26	31.3%	100%
Cytogenetics	Standard risk	73	88.0%	88.0%
	Presence of high-risk mutations	10	12.0%	100%
Comorbidities	Yes	71	85.5%	85.5%
	No	12	14.5%	100%
Treatment status	Remission	33	40.2%	40.2%
	Active treatment	49	59.8%	100%
Radiotherapy	Yes	16	19.3%	19.3%
	No	67	80.7%	100%
Osteolysis/pathological bone fractures	Yes	44	53.0%	53.0%
	No	39	47.0%	100%

Figure 1 Boxplot showing differences in interest in religious issues, grouped by treatment status.

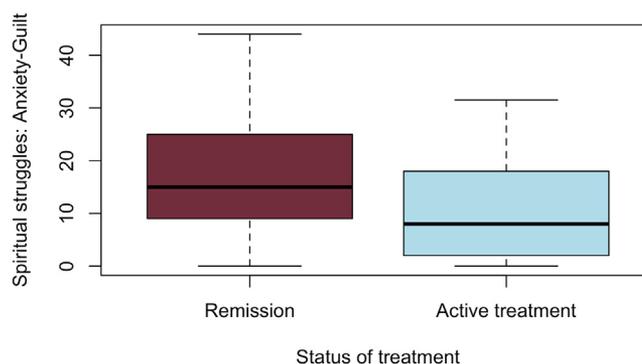
tion is exacerbated and psychological adjustment is negatively affected (ie, dysfunctional change of beliefs). This means that the use of negative methods of religious coping is accompanied by dysfunctional changes of beliefs as a result of illness.

- A moderate positive correlation between anger towards God and negative perception of goals during the illness ($r = 0.353$, $P < .01$). General goals represent desired end states, cherished ideals, or existing states that people seek to maintain (eg, health). Negative perception of goals refers to the extent to which the illness interferes with the achievement of these general goals. The greater the anger towards God declared by the respondents, the

more often they perceived unfavorable changes of goals during their illness, ie, they negatively evaluated the impact of R/S on their adaptation to the illness.

- Negative changes of goals as a result of the illness were associated with an unfavorable assessment of physical functioning ($r = 0.396$, $P < .001$), role functioning ($r = 0.346$, $P < .01$), emotional functioning ($r = 0.443$, $P < .01$), and cognitive functioning ($r = 0.453$, $P < .001$).

Patients who underwent autologous stem cell transplantation (ASCT) rated their physical functioning as better than patients who

Figure 2 Boxplot showing differences in Anxiety-Guilt spiritual struggles grouped by treatment status.**Table 3** Matrix Showing Selected Correlations of Psychological Variables in the Sample (N = 83)

	Anger Towards God	Negative Religious Coping	Interest in Religious Issues	Changes in Beliefs During Illness	Changes in Goals During Illness
Anger towards God					
Negative religious coping	0.194				
Interest in religious issues	-0.178	0.051			
Changes in beliefs during illness	0.130	0.332 ^b	0.086		
Changes in goals during illness	0.353 ^b	0.122	-0.118	0.415 ^a	
Physical functioning	0.225 ^c	0.092	-0.321 ^b	0.126	0.396 ^a
Role functioning	0.229 ^c	0.087	-0.349 ^b	0.162	0.346 ^b
Role functioning	0.366 ^a	0.271 ^c	-0.100	0.357 ^a	0.443 ^a
Cognitive functioning	0.191	0.056	-0.188	0.191	0.372 ^a
Social functioning	0.201	0.149	-0.151	0.143	0.452 ^a

^a $P < .001$.^b $P < .01$.^c $P < .05$.

did not undergo such treatment ($t = 2.587$, $P < .01$, $d = 0.602$) (Figure 3).

Patients who were in the active phase of treatment assessed their physical functioning as worse than patients who were in remission ($t = 2.172$, $P < .05$, $d = 0.491$) (Figure 4).

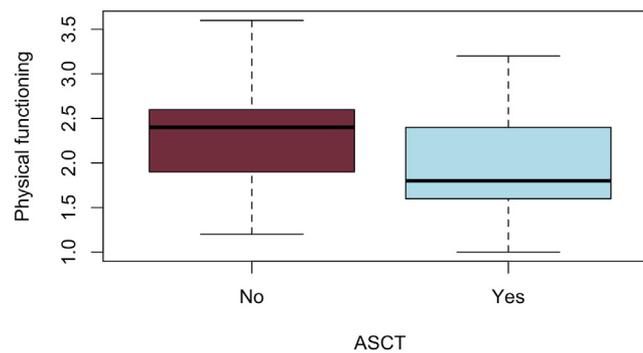
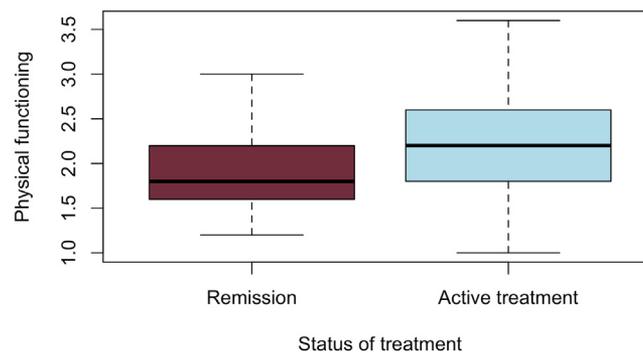
Discussion

This study is one of the first to describe the spirituality and religiousness of patients with MM and to assess the impact of R/S on the HRQoL of these patients. Previous studies on R/S in MM patients focused primarily on positive and negative R/S coping prior to autologous stem cell transplantation (ASCT).^{30,31} In another study conducted among hematology and oncology patients qualified for ASCT, MM patients constituted more than half of the study group. In the analysis of patients' styles of coping with illness, R/S coping was distinguished as the third most frequent of the 5 coping styles (after active coping and distraction, and before minimizing and depressive coping).³² In the latest study on QoL, social support, and religiosity among MM patients, R/S was assessed in 3 domains: organizational religiosity (formal/institutional), non-organizational religiosity (adopted by the individual), and intrinsic

religiosity (motivation for religiosity). Only the intrinsic religiosity dimension obtained a high score in this group of patients. Catholic patients more strongly perceived religiosity in the dimension of organizational religiosity scale than representatives of other denominations.¹²

The literature shows that negative R/S coping was associated with significantly poorer functioning in patients with MM on all the following outcomes: depression, distress, mental health, pain, and fatigue. Only physical functioning was not affected by negative R/S coping.³⁰ The data from another study that explored the issue of negative R/S coping in ASCT patients showed an association between negative religious coping at baseline and worse post-transplant anxiety, depression, emotional well-being, and transplant-related concerns.³¹ In our research, positive and negative R/S coping in MM patients and their impact on HRQoL were evaluated. Our findings are generally consistent with observations from the literature.^{30,31} We found that anger towards God, which is an example of negative emotions and negative religious struggle, was greater in patients with poorer emotional functioning. This association was not observed for overall QoL and other dimensions of QoL (physical functioning, role functioning, cognitive function-

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Figure 3 Boxplot showing differences in Physical functioning depending on marrow transplantation.**Figure 4** Boxplot showing differences in Physical functioning depending on treatment status.

ing, and social functioning). Anger towards God was correlated with a perception of unfavorable goal changes during the illness. A positive covariance was observed between negative R/S coping and dysfunctional changes in beliefs during the illness. These findings show that negative R/S coping may contribute to deterioration of the emotional part of QoL. Another observation from the literature is that neither general religiousness nor positive religious coping are significantly related to any of the measured outcomes (depression, distress, mental health, pain, fatigue, and physical functioning).³⁰ Our findings are in line with these observations. We did not observe any correlation between positive R/S coping and HRQoL in MM patients. However, it should be noted that several studies conducted among patients with different types of cancers emphasize an association between greater use of positive R/S coping and better QoL.^{33,34}

Our study revealed that patients in remission declared a significantly higher interest in R/S issues than patients in active treatment. The common belief that people turn to R/S as it helps them cope in times of crisis was not confirmed. In the literature, few publications compare R/S in these 2 periods of disease (active treatment and remission), and their results are inconclusive. Studies on cancer survivors show that daily spiritual experiences were associ-

ated with greater self-assurance and less fear of cancer recurrence.³⁵ In an analysis of patients with advanced cancers, the greater use of positive R/S coping was associated with more physical symptoms.³³ Similarly, in a study exploring HRQoL in MM patients, disease symptoms were positively associated with spirituality.¹⁰ The authors suggested that perhaps patients who experienced greater physical symptoms turned to R/S more often for strength, comfort, and guidance. In contrast, our study revealed greater R/S involvement during remission, where the burden of physical symptoms is lower compared to the active phase of the disease. Furthermore, we noted that patients who assessed their physical functioning and role functioning as worse showed a lower interest in R/S issues. Dürner et al.¹¹ showed that spirituality was mentioned more frequently as one of the areas relevant for HRQoL by patients in the first year after MM diagnosis compared to patients diagnosed earlier. Höcker et al.³⁶ did not observe differences in the intensity of spiritual needs in the various phases of disease (remission, partial remission, stable disease, progression, and unclear phase) in a sample of early and advanced cancer patients. This indicates that spiritual needs are not limited to the advanced cancer stage but occur independently at any time during the course of the disease. In contrast, our study found a higher percentage of intrapsychic R/S struggles dominated by

anxiety and guilt among patients in remission compared to patients in the active phase of the disease.

Considering the impact of clinical variables on HRQoL in MM patients, we observed better physical functioning among patients undergoing ASCT. According to the literature, HRQoL initially decreases during the transplant process, with subsequent improvement 1 to 2 months after transplantation.¹⁴ Poorer HRQoL during transplantation results from both physical (eg, severity of symptoms, drug toxicity) and emotional/ psychological issues (eg, patient isolation).⁶ Our second observation was that patients in the active phase of treatment rated their physical functioning worse than did patients in remission. Acaster et al.¹³ noted that a long treatment-free interval may be associated with improved HRQoL in MM.

What is unique in our study is the assessment of changes in patients' goals and beliefs in relation to the illness, which to the best of our knowledge has not been previously evaluated in connection with R/S in this group of patients. We noted a positive covariance between the presence of dysfunctional beliefs and negative R/S coping. As these data are cross-sectional, conclusions about causality cannot be drawn in either direction. Thus, although it is likely that R/S coping influences patients' beliefs, it is equally possible that patients who experience destructive beliefs are more inclined to adopt negative coping methods. The tendency to form dysfunctional beliefs may stem from unfavorable factors, such as low self-esteem, depression, and adverse personality traits. Although several studies have shown that cancer patients do not seem to differ in self-esteem from healthy subjects,³⁷ a study of hematological cancer patients demonstrated lower self-esteem in a group of cancer patients than the national norm.³⁸ Higher self-esteem was associated with hope and a positive coping style.³⁸ Thus, hope, which is part of positive religious coping, can influence personal self-esteem and contribute to forming positive beliefs. Conversely, positive beliefs can influence better personal self-esteem, hope, and positive coping.

The assessment of changes in goals in our study included determining the extent to which the illness interfered with personal goals (eg, in terms of physical health, family and social relationships, or professional achievements). A positive correlation was seen between anger towards God and goal disturbance. Additionally, negative changes in goals during the illness were associated with an unfavorable assessment of physical functioning, role functioning, emotional functioning, and cognitive functioning. The literature confirms that cancer disrupts daily life, impairs HRQoL, and is negatively related to attainment of goals.^{39,40} Pinquart et al.⁴⁰ found the main effects of cancer on life goals compared to healthy controls: a lower total number of goals; a focus on social, transcendental, and health-related goals rather than achievement-related goals; greater perceived difficulty of goals; a stronger focus on short-term rather than long-term goals; and lower investment of effort in goal attainment.

Study Limitations

To our best knowledge, this is the first study to extensively explore R/S among MM patients and its impact on HRQoL. The presented study has some limitations. First, the investigated group consisted exclusively of Catholics, which limits the possibility of generalizing the results to other religious groups. Second, 4 patients had concomitant cancers that probably affected their HRQoL. Finally,

the assessment of personality types and depression in the study group could be a valuable supplement to the assessment of the impact of R/S on patients' HRQoL.

Conclusions

The findings of our study highlight the importance of R/S for the HRQoL of patients with MM and show that their QoL depends on the types of R/S coping used. Negative R/S coping strategies were associated with unfavorable changes in goals during the illness. Negative emotions toward God were related to a negative self-evaluation of HRQoL. The treatment phase affects the assessment of HRQoL. Patients in the active phase of the disease and before bone marrow transplantation assessed their HRQoL as worse than did patients in remission and after the transplant procedure. Involvement in R/S issues was greater during disease remission than in the active phase. R/S intrapsychic struggles dominated by anxiety and guilt occurred more often during remission than during the active phase of the disease. The practical conclusion of the presented research is that addressing R/S issues within hospital care would be particularly beneficial for patients who use R/S strategies to cope with their illness. Negative R/S responses to illness (ie, negative coping) are an important area of further investigation.

Clinical Practice Points

- A sick person looks to religion or spirituality for support as a conceptual framework for interpreting his or her difficult experiences, and as an opportunity to reevaluate goals and aspirations. Some spiritual practices, such as meditation and prayer, allow people to feel contact with a Supreme Being. All these methods, which can be described as positive coping, can contribute to improved mental health and a reduced sense of loneliness and anxiety, and they give patients hope.^{1,33}
- However, in some cases, the use of elements of religiosity or spirituality may lead to adverse outcomes. Patients who tend to experience their spirituality or religiosity in a negative way (e.g., they perceive God as someone who has abandoned them and who is punishing them for their sins) may be predisposed to anxiety and depression.^{1,33} This largely depends on the type of religiosity or spirituality (mature vs. immature forms) and the way in which the religious/spiritual content is used (positive vs. negative coping).
- HRQoL assessment plays a key role in the evaluation and treatment of oncology patients.
- An objective and precise examination of religious and spiritual factors can increase the understanding of their positive and negative roles in adaptation to cancer.

Authors' Contributions

Weronika Lebowa: conception and design of the study, acquisition of data, analysis, and interpretation of data, drafting the manuscript, revising the manuscript. **Jacek Prusak:** conception and design of the study, analysis, and interpretation of data, drafting the manuscript, revising the manuscript. **Marlena Leśniak:** conception and design of the study, acquisition of data, analysis, and interpretation of data, drafting the manuscript. **Jakub Wasiewicz:** analysis and interpretation of data, drafting the manuscript.

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Artur Jurczynszyn: conception and design of the study, acquisition of data, revising the manuscript.

Disclosures

The authors report there are no competing interests to declare.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.clml.2023.08.013.

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