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# The effect of curcumin on symptoms and quality of life in patients with irritable bowel syndrome

Original Study

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**Abstract**

**Introduction.** Irritable bowel syndrome (IBS) is the cause of numerous gastroenterological consultations. Due to multifactorial pathogenesis, treatment of IBS is difficult. Even the management with new medications appears unsatisfactory. Recent reports on IBS therapy highlight the possible beneficial effect of curcumin. The aim of the study was to assess the efficacy and safety of curcumin in IBS patients.
**Materials and Methods.** Our non-controlled study included 51 patients: 30 (58.8%) women and 21 (41.2%) men diagnosed with IBS based on Roman Criteria IV, 35 patients with diarrhea-predominant (IBS-D) variant and 16 with constipation-predominant (IBS-C) variant. The quality of life and severity of symptoms were assessed with the IBS Symptom Severity Score (IBS-SSS) and IBS Quality of Life Instrument (IBS-QoL) questionnaires in all patients at: 0, 4, and 12-week time points.
**Results.** A statistically significantly lower IBS-SSS score was found after 4 and 12 weeks of using curcumin ($p < 0.01$), especially in the category of bloating and severity of abdominal pain. After 4 weeks of using curcumin, a reduction in the mean IBS-SSS score decreased from 279.7 to 202.2 points ($p < 0.05$). There was a significant increase in the overall score obtained with IBS-QoL questionnaire after the first 4 weeks of taking curcumin compared to baseline visit (41,9 vs. 53,4; $p < 0.05$). No side effects have been reported associated with the curcumin use.
**Conclusions.** In summary, curcumin is effective in reducing the IBS clinical symptoms and improving the patients' quality of life. It also has a high safety profile.

**Keywords**

curcumin • irritable bowel syndrome • quality of life • IBS treatment

## 1. Introduction

Irritable bowel syndrome (IBS) is one of the most common functional disorders of the gastrointestinal tract. It is estimated that the prevalence of IBS in the general population is 11% [1, 2]. However, in young patients between 18 and 30 years of age, the incidence of IBS is found to be much higher, reaching a value of 24% [3]. Depending on the dominating symptoms IBS can be classified into three categories: diarrhea predominant IBS (IBS-D), constipation predominant IBS (IBS-C), mixed form (IBS-M) and unspecified (IBS-U). The etiopathogenesis of IBS is complex, multifactorial and not fully understood. Recently, many authors have advocated for looking at the role of gut-brain axis disorder associated with an altered composition of the intestinal microbiota. The pathogenesis of IBS also includes disorders of gastrointestinal tract motility, visceral hypersensitivity, impaired immune function of the intestinal mucosa, and disorders of the central nervous system [4]. The main goal of IBS treatment is to control symptoms which hinder the patient's daily functioning and significantly worsen the quality of life (QoL) [5]. In view of such multifactorial pathogenesis, the treatment of IBS is difficult and multidirectional, and the current pharmacotherapies are not very satisfactory. New medicines, including herbal preparations, that could improve the treatment efficacy are being investigated [6, 7]. Recently published studies suggest a beneficial effect of curcumin in treatment of IBS [8, 9, 10]. Curcumin is the plant substance obtained from the rhizomes of the Asian perennial *Curcuma longa*. It is a widely available spice and dietary supplement. The mechanism of action of the curcumin preparation is complex, with antioxidant, anti-inflammatory, and even anti-cancer activity [11, 12]. The anti-inflammatory properties of curcumin result from the reduced activation of NF-kB (nuclear factor kappa B) and lower expression of many proteins involved in the inflam-

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matory process, such as cycoloxygenase-2 (COX-2) and interleukin 8 [13, 14, 15, 16]. In recent years, several studies have been conducted to assess the effects of curcumin on IBS which have shown promising results [8, 9, 10]. The aim of our study was to evaluate the efficacy and safety of curcumin in patients with IBS.

## 2. Materials and Methods

The study included 51 adult patients (30 women and 21 men) diagnosed with IBS based on Rome IV criteria (35 IBS-D and 16 IBS-C patients), treated as outpatients in the Department of Digestive Tract Diseases at the Barlicki Memorial Hospital in Łódź, Poland in 2017–2018. Each patient signed a written consent to participate in the study. Patients with mixed symptoms or an unspecified type of IBS were not included in this study. Patients enrolled in the study received previously individually determined stable pharmacotherapy of IBS for at least 3 months before enrollment in the study (antispasmodics, peppermint oil, probiotics, macrogols, and loperamide). In order to avoid the influence of other factors, patients also did not introduce dietary modifications from the moment of inclusion in the study throughout its duration. Each patient was carefully instructed on a screening visit on dietary principles during the study. The study participants' diets were assessed at each follow-up visit during an interview with the patient. None of the participants changed their diet during the study. The approval of the Bioethics Committee of the Medical University of Łódź was obtained for the study (RNN/295/16/KE 06.12.2016).

A non-controlled, open study was performed. Each patient participating in the study during 12-week period was taking an oral curcumin (CUMIND HR) at a dose of 600 mg once daily (OD) during a meal, which was provided by Global Pharmacia sp. z o. o. All patients, additionally to qualification visit (visit 0), had two follow-up visits, at 4 and 12 weeks (visit 1 and 2, respectively) after the enrollment in the study. During each visit, the QoL, the presence and severity of symptoms were assessed with the IBS Symptom Severity Score (IBS-SSS) and IBS Quality of Life Instrument (IBS-QoL) and questionnaires. The IBS-SSS questionnaire was used to classify patients into different disease severity groups: severe (> 300 points), moderate (≥ 175 and ≤ 300 points) and mild (< 175 points). A result below 75 was treated as a remission of the disease [17].

In the statistical analysis the results were expressed as mean +/- standard deviation. Assumption of the normal distribution of differences was verified with the use of the Shapiro–Wilk test. As the normality assumption was violated, the significance of differences was tested with Mann–Whitney's U test to compare two independent groups. A p value $< 0.05$ was considered statistically significant. The statistical analysis was performed using the Statistica 13.1 package (StatSoft Polska).

## 3. Results

Fifty-five patients diagnosed with IBS were recruited into the study. Four of them did not continue with the study at various stages. The final analyses were performed in 51 patients; 30 (58.8%) women and 21 (41.2%) men. The mean age of the patients in the analyzed group was 52.6 ± 15.9 years. The patients most frequently enrolled in the study were of IBS moderate severity (49.0%), severe (43.2%), and less often mild (7.8%; Table 1).

When comparing the severity of the disease at the time of study entry and after 4 and 12 weeks of using curcumin, a statistically significantly lower IBS-SSS score was found (279.71 vs.202.16 [$p < 0.05$] and 202.16 vs. 155.78 [$p < 0.01$]; Figure 1). During the evaluation of the individual components of this questionnaire, a statistically significant improvement was found in all categories at Visit 1, and this effect strengthened at Visit 2 (Figure 2). The highest effect was observed on the domain of distension and the severity of abdominal pain (46.67 vs. 31.37 and 54.02 vs. 36.08 respectively).

When analyzing changes in the QoL of patients with IBS during the study, a significant increase in the overall score of the IBS-QoL questionnaire was noticed after the first 4 weeks of taking curcumin (41.89 vs. 53.44; $p < 0.05$; Figure 3). When analyzing the individual domains of the IBS-QoL scale, we noticed that the QoL related to social reactions and relationships improved significantly after 12 weeks of using curcumin (48.31 vs. 74.59 and 48.53 vs. 78.53 respectively; $p < 0.01$), while in the other domains we observed a significant improvement after 4 weeks (Figure 4). A trend in increasing the sexual function subscore was noted with each visit; however, no statistically significant differences was noted.

When analyzing the effectiveness of curcumin no statistically significant differences were found between patients with IBS-C and IBS-D (data not shown).

During the study no side effects were reported related to the intake of curcumin.

*Table 1. Characteristics of the study group*

| | | | |
|---|---|---|---|
| n<br>Sex | | 51 | |
| | female n (%) | 30 (58.8) | p = 0.08 |
| | male n (%) | 21 (41.2) | |
| Age (years) | | 52.6 ± 15.9 | |
| | female | 56.9 ± 14.2 | p = 0.02 |
| | male | 46.6 ± 16.5 | |
| Severity of IBS<br>n (%) | mild | 4 (7.8) | p = 0.55 |
| | moderate | 25 (49.0) | |
| | severe | 22 (43.2) | |
| Type of IBS<br>n (%) | diarrhea | 35 (68.6) | p < 0.05 |
| | constipation | 16 (31.4) | |

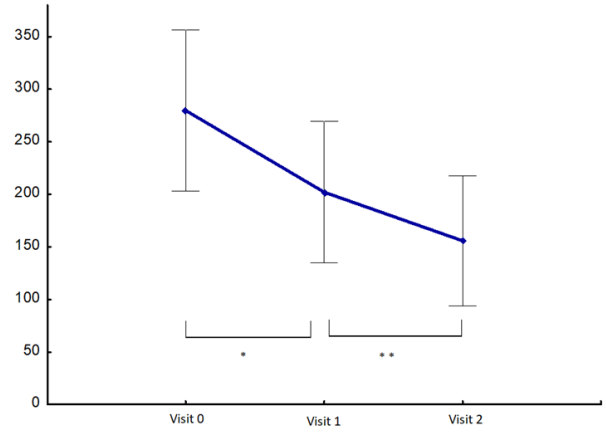



*Fig. 1. Disease activity scores on the IBS-SSS scale at initiation of treatment (visit 0) and after 4 (visit 1) and 12 weeks (visit 2) of curcumin treatment (mean ± SD), * p < 0.05 compared to visit 0, ** p < 0.01 compared to visit 1*

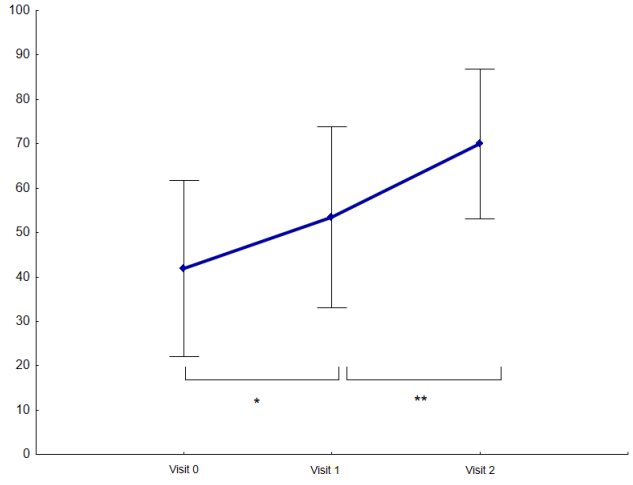



*Fig. 3. Results of overall quality of life scale (IBS- QoL) at initiation of treatment (visit 0) and after 4 (visit 1) and 12 weeks (visit 2) of curcumin consumption (mean ± SD). * p < 0.05 compared to visit 0, ** p < 0.01 compared to visit 1*

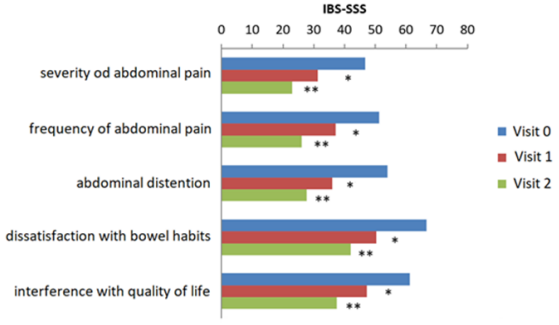



*Fig. 2. Changes in individual categories of IBS-SSS from the start of treatment (visit 0), after 4 (visit 1), and 12 weeks (visit 2) of curcumin consumption * p < 0.05, compared to visit 0, ** p < 0,01, compared to visit 0*

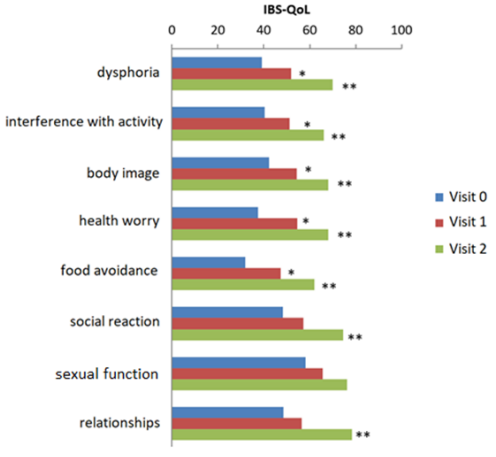



*Fig. 4. Quality of life results in individual domains at the start of treatment (visit 0), after 4 (visit 1), and after 12 weeks (visit 2) of curcumin use. * p < 0.05, compared to visit 0, ** p < 0.05, compared to visit 0*

## 4. Discussion

IBS is a chronic disease that reduces QoL, has a multifactorial etiopathogenesis, and represents a therapeutic challenge to clinicians. Our study shows the positive effect of curcumin on the severity of symptoms. This herbal preparation reduces pain and malaise, as well as regulating gastrointestinal motility. These effects have also been confirmed in other clinical trials. Bundy et al. analyzed the effect of supplementation with turmeric extract on IBS prevalence, QoL associated with occurrence of symptoms, and the effectiveness of symptom reduction [8]. The study lasted for 2 months and analyzed two doses: 72 mg and 144 mg of turmeric extract. After treatment, significant improvements were noted in almost all domains of IBS-QoL scale in 67% of patients receiving the lower dose and 70% after higher dose of the turmeric extract [8]. Portincasa et al. analyzed the effect of the combination of curcumin with fennel oil (CU-FEO) in patients with IBS [10]. After one month of treatment, a statistically significant reduction in IBS symptoms were noticed, the mean value of the IBS-SSS scale decreased from 255.7 ± 39.9 to 127.8 ± 77.2 points, what is more, a considerable number of patients (25.9%) achieved complete disease remission [10]. Our current observations are in general agreement with those reported by others following supplementation of turmeric. Similarly to our study, Portincasa et al. also noted a quick effect of the studied herbal medicine on the severity of abdominal pain – a reduction in pain severity of 50% was achieved by more than half (63.8%) of the studied patients after one month of treatment [10]. Authors also observed a significant increase in QoL, especially in domains such as dysphoria, interference with activity, percep-

tion of body image, and food avoidance [10]. In our study we also noticed a significant improvement in these domains. However, the fastest increase was noted in domains related to worry about health, and the slowest, but also statistically significant, increase in domains related to interpersonal relations and social relations. The results of these studies clearly show that herbal preparations, including curcumin, are highly effective in treating functional disorders of the digestive tract. Curcumin was shown to sooth the inflammation, reduce the oxidative stress, lower the increased blood pressure and present metabolic properties [18]. The efficacy of curcumin in IBS seems to be multifactorial. As patients with IBS exhibit low-grade mucosal inflammation, the ability of curcumin to attenuate circulating IL-6 levels and modulate other inflammatory pathways is relevant [19]. Additionally, curcumin was found to reverse the impaired hypothalamic-pituitary-adrenal axis that results in visceral hypersensitivity, another hallmark of IBS pathophysiology [20]. Moreover, in the study by Wang et al. curcumin helped to maintain a mucosal integrity in lipopolysaccharide-induced inflammation in Caco-2 and HT-29 cells [21]. Due to its pleiotropic effects, curcumin is of interest in various fields of medicine and in various diseases. Positive effects of curcumin therapy have also been demonstrated in patients with inflammatory bowel diseases. The use of curcumin in these patients reduced clinical symptoms and resulted in healing of endoscopic lesions [22, 23]. In one randomized Japanese study with patients suffering from ulcerative colitis, it was shown that administration of curcumin in combination with 5-ASA preparations caused reduced recurrences of the disease. In patients taking only 5-ASA preparations during the course of the study (6 months), exacerbation was more frequent compared to patients taking additionally curcumin at a dose of 2 g/day (20.51% vs. 4.65%; $p = 0.04$). Moreover, in the group of patients taking curcumin, a significant improvement in endoscopic lesions was found, assessed based on the Rachmilewitz endoscopic index [22]. It is particularly important due to the neuroinflammatory hallmark of IBS pathogenesis and reports on overlap between IBS and inflammatory bowel diseases [24].

Curcumin is found to be quite safe, with no significant side effects. The most common side effects are flatulence and nausea. In our study, we did not observe any significant adverse effects of curcumin. In the previously mentioned Japanese study with curcumin at a dose of 2 g/day, no serious side effects were reported, and only a few patients reported mild bloating or nausea [22]. In the study carried out by Bandy et al., there were only mild side effects reported, such as flatulence and dry mouth [8]. Cheng et al. analyzed the effect of curcumin on cancer chemoprevention, where curcumin was used up to 8 g/day and found no toxic or serious side effects associated with the use of this preparation, confirming the beneficial effect of curcumin [25]. Cheng et al. also observed histological improvement of precancerous lesions in 7 out of 25 patients with various high-risk and pre-malignant lesions [25]. Curcumin preparations have also been used with good results in many clinical trials in the treatment of cancers of various organs [24, 26, 27].

Our study results may appear misleading, as no placebo was used. However, the above-mentioned studies, including a randomized controlled trial conducted by Portincasa et al., already proved the efficacy of curcumin in a controlled study [10]. In our opinion, the results we achieved should be regarded as complementary to those in other trials. Namely, we managed to show the efficacy of the dose studied (600 mg, OD), in the longer course of treatment without inducing any mild or serious treatment-emergent adverse events. Also, we showed that longer treatment (12 weeks) is superior to the short-term treatment presented in other studies with curcumin in IBS. Of note, in a large study by Hou et al. [28] addressing the efficacy of mebeverine hydrochloride or pinaverium bromide in IBS, no placebo was used. Generally, the placebo effect is extensively reported in trials with IBS patients; however, it is characterized by early occurrence and is unlikely to persist in longer treatment regimens. We prolonged the treatment to 12 weeks [28, 29], thus overcoming any confounding placebo effect. The major drawback of our design is a small sample group; however, performing a large-scale trial was not our primary goal. Lastly, as a portion of patients diagnosed with IBS based on Rome III criteria do not fulfill Rome IV criteria our study stands as a substantial update to previously reported studies [30].

## 5. Conclusions

In summary, results of our current investigation revealed that the use of curcumin could be a potential therapeutic strategy for IBS as it appears to be effective in enhancing QoL, safe, and well-accepted. We hope our study will pave the way for future large-scale multicenter studies addressing the efficacy of curcumin in the treatment of IBS symptoms.

## Authors' Contribution

**M.W.**: research concept and design, carrying out the experiments, acquisition of data, data analysis and interpretation, writing - original draft preparation, visualization, literature review; **A.F.**: data analysis and interpretation, writing - original draft preparation, visualization, literature review; **R.T.W.**: research concept and design, supervising the project, writing - review and editing, literature review; **E.M.W.**: research concept and design, supervising the project, writing - review and editing, literature review, final proofreading and approval of the version for publication, funding acquisition.

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## Conflict of Interest

The work was partially funded by Global Pharmacia sp. z o. o. The funders had no role in the design of the study, in the collection, analyses, or interpretation of data, in the writing of the manuscript, or in the decision to publish the results.

## Ethics Approval

The approval of the Bioethics Committee of the Medical University of Łódź was obtained for the study (RNN/295/16/KE 06.12.2016).

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