RESEARCH ARTICLE

The Impact of Probiotics (*Bifidobacterium Animalis* and Lactobacillus BB-12) on the Quality of Life and Defecation Habits after Colorectal Excision Surgery

Kolorektal Cerrahi Rezeksiyonlarından Sonraki Probiyotik (*Bifidobacterium Animalis* ve Lactobacillus BB-12) Tedavisinin Hayat Kalitesi ve Dışkılama Alışkanlıkları Üzerindeki Etkisi

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▮▮▮▮▮▮▮ **ABSTRACT**

Aim: Intestinal microbiota plays a vital role for the function and integrity of the gastrointestinal tract. Recent studies indicate the efficacy of probiotics containing bacterial agents and microbiota elements on certain gastrointestinal diseases. The aim of our study was to investigate the improving effect of *Bifidobacterium animalis* and Lactobacillus BB-12 on the quality of life and depression by means of monthly tests on patients who underwent colorectal resection for benign reasons.

Method: In our study 20 patients who underwent colorectal surgery for different reasons were given *Bifidobacterium animalis* and Lactobacillus BB-12. Their life quality and depression scores were evaluated monthly.

Results: Although no statistical change was seen on three Beck Depression Scale with time improvements were observed in the physical function, physical role, emotional role, vitality and pain subgroup parameters on Short Form-36 life quality evaluation scale.

Conclusion: Probiotics can be used as a supporting agent to restore the distorted intestinal microbiota of post-operation. Although probiotics don't help to recover from post-operative depression, they are beneficial to life quality parameters through time. We believe that the efficiency of probiotics on post-operative period should be analysed with more studies.

Keywords: Probiotics, colonic surgery, life quality, depression

▮▮▮▮▮▮▮ **ÖZ**

Amaç: İntestinal mikrobiyota gastrointestinal sistem çalışması ve bütünlüğü için hayati önem taşımaktadır. Yapılan çalışmalar mikrobiyota elemanlarını kapsayan bakteriyel ajanları içeren probiyotiklerin birtakım gastrointestinal hastalıklarda yararlılıklar gösterdiğini ortaya koymaktadır. Çalışmamızda benign nedenlere bağlı kolon rezeksiyonu uygulanan kişilere verilen *Bifidobacterium animalis* ve Lactobacillus BB-12'nin hayat kalitesi ve depresyon üzerindeki düzeltici etkisinin aylık testlerle ortaya konulması amaçlanmıştır.

Yöntem: Çalışmamızda değişik nedenlerle kolon rezeksiyonu geçirmiş 20 hastaya *Bifidobacterium animalis* ve Lactobacillus BB-12 verilmiş ve aylık olarak hayat kalitesi ve depresyon ölçekleri ile değerlendirme yapılmıştır.

Bulgular: Yapılan üç Beck Depresyon Skalası ölçümünde zaman içerisinde istatistiksel bir değişim saptanmamasına rağmen Kısa Form-36 hayat kalitesi tespit ölçeğinde fiziksel fonksiyon, fiziksel rol, emosyonel rol, vitalite, ağrı alt grup parametrelerinde istatistiksel düzelme sağlanmıştır.

Sonuç: Probiyotikler cerrahi sonrası değişen intestinal mikrobiyotanın tekrar sağlıklı bir insan düzeyine gelmesi için destek verici bir ajan olabilir. Operasyon sonrası gelişen depresyonun düzelmesine yardımcı olmasa da günlük yaşamda hayat kalitesi ölçeklerinde zamansal olarak probiyotikler katkı sağlamaktadır. Probiyotik tedavisinin postoperatif dönemlerde geliştireceği yararlılıklar konusunda daha iyi analizlere ihtiyaç olacağı düşüncesindeyiz.

Anahtar Kelimeler: Probiyotikler, kolonik cerrahi, hayat kalitesi, depresyon

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Introduction

Gastrointestinal system is a natural host for nearly 1000 types of microorganisms including mainly Firmicutes and Bacterioides strains.[1] Colon microbiota is dominantly composed of anaerobic bacteria.[2] Intestinal microbiota plays an essentially vital role in gastrointestinal system integrity and functions.

According to World health Organization's definition, probiotics are the microorganisms that provide health benefits when the host is supplied enough amounts of them.[3] Probiotics are mostly obtained from food products and mainly from cultured milk products.[4] Previous studies have demonstrated that probiotics provide many health benefits in some of the gastrointestinal diseases like pouchitis especially due to inflammatory disorders.[5] Also the therapeutic use of probiotics were studied on Clostiridium Difficile colitis, Irritable bowel syndrome, hepatic encephalopathy and allergic diseases.[6,7]

The ecological balance between human body and the guest microorganisms is disrupted by the applied antimicrobial agents and as a result of this, antibiotic-resistant microbial strains emerge and the microbiota members decrease in number.[8,9] An intensive change in the number and the composition of normal bacteria in human flora occurs due to antibiotic use in short term period.[10] Colorectal surgeries are high risk interventions for surgical region infections because of the excess amount of endogenous microorganisms in colon and rectum.[11] In the patients who had been applied colon resection, the need for perioperative antibiotic use deeply affects the intestinal microflora negatively.[12] The effects of short term antibiotic treatment on intestinal flora may last as long as 24 months.[12] In clinical studies, it has been detected that bacteroides family existing normal flora

has been related to depression.[13] I was demonstrated that life quality of the probiotic using patients has been improved in 6 months period.[14]

Aim of this study is to investigate the effectiveness of probiotic treatment following the end of postoperative antibiotic treatment on life quality and depressive mood intensity for the patients who had been applied colon operations due to benign diseases.

Materials and Methods

Our study was performed at Mersin Public Hospital with a decision no of 2014/217 approved at 25.09.2014 by Mersin University Clinical Research Ethical Committee. The prospective life quality and depression scores of 20 patients who had been applied colon resection due to benign reasons and had taken less than one week short term antibiotherapy between October 2014 and October 2015 were included in the research of the study. The life quality scores of the patients were measured via Short Form 36 (SF-36) life quality scale and depression analysis was done by Beck Depression Scale. In SF-36 life quality scale, the physical function (PF), physical role difficulty, emotional role (ER), liveliness, pain, mental function, social relationship, perception of general health were all scored between 0-100 points. Following the end of the antibiotic treatment of operated patients, *Bifidobacterium animalis* 3×10^9 CFU and Lactobacillus BB-12 3×109 treatment was applied. Monthly SF-36 life quality scale and depression scores (Beck Depression Scale) together with the defecation numbers have been recorded for 3 months during the control visits. Only the 3rd month ER score of 1 patient, and 3rd month physical role score of 1 patient couldn't have been recorded because they had missed the control visits.

Table 1. Short Form-36 life quality score analysis

Short Form-36	1st month Short Form-36 analysis	2nd month Short Form-36 analysis	3rd month Short Form-36 analysis	p values		
				p1*	p2**	p3***
Physical function score	50.55	55.6	61.6	0.88	0.72	0.25
Perception of physical role	31.5	41.2	54.2	0.4	0.14	0.019
Emotional role	25	50.6	63.3	0.002	0.034	0.00
Liveliness	43.95	55.26	53.1	0.009	1	0.132
Mental function	59.7	64	76.5	0.1	0	0.005
Social relations	50.55	55.6	6.16	0.88	0.72	0.25
Pain	36.3	53.7	58.9	0.06	0.95	0.009
General health perception	49.9	59.1	59.5	0.181	1	0.126

*p1: p value of 1st month and 2nd month Short Form-36 evaluation results
**p2: p value of 2nd month and 3rd month Short Form-36 evaluation results
***p3: p value of 1st month and 3rd month Short Form-36 evaluation results

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Statistical Analysis

The data obtained from the study groups were analysed by using SPSS (Statistical Package for the Social Sciences version 13, Chicago, Illinois, USA). Shapiro-Wilk test was used for sample distribution normality detection. In our study, the repeated measurements done in consequent dates were analysed and evaluated with Anova analysis. The sample t-test was used for double comparison and chi-square test was used for the analysis of sex variables in our study. The values were given as mean ± standard deviation (SD). In the study, a value of $p<0.05$ was accepted as statistically significant.

Results

In our study which included 20 patients, there were 14 (70%) male and 6 (30%) female cases. The average age of the patients was 53.3 (26-88). The average postoperative antibiotic usage duration of the patients was 4.1 (2-7) days. When the patients were assessed considering PF scores, no difference was observed for the first month (1st month vs. 2nd month; p=0.7), whereas some significant positive differences were observed between 3rd and 1st months (1st month vs. 3rd month; p=0.003) and 2nd month with 3rd month (2nd month

vs. 3rd month; p=0.008). When the physical role (PR) score is considered, there was a significant difference between 1st and 3rd months (1st month vs. 3rd month; p=0.019), whereas no significant difference between 1st and 2nd months (1st month vs. 2nd month; p=0.4), and no difference between 2nd and 3rd months (2nd month vs. 3rd month; p=0.14) was observed. When the ER score was evaluated, statistically significant differences were detected in the first month between 2nd and 3rd months as well as between 1st and 3rd months (1st month vs. 2nd month; p=0.002), (2nd month vs. 3rd month; p=0.034), (1st month vs. 3rd month; p=0.00). In the Liveliness Score subgroup, there was a significant difference between 1st and 2nd month measures (1st month vs. 2nd month; p=0.009), while no statistically significant difference was detected between 1st month and 3rd month (1st month vs. 3rd month; p=1) and between 2nd month and 3rd month (2nd month vs. 3rd month; p=0.32). In Mental status assessment, significant differences were detected between 2nd month and 3rd month (2nd month vs. 3rd month; p=0.00) and between 1st month and 3rd month scores (1st month vs. 3rd month; p=0.005), whereas no difference was observed between 1st month and 2nd month (1st month vs. 2nd month; p=1). In pain scoring of SF-36 subgroups, a significant

Table 2. Albumin, hemoglobin, C-reactive protein, sedimentation values with age and gender distributions of 20 patients included in the study

	Age	Gender	C-reactive protein	Sedimentation	Hemoglobin	Albumin	Surgery
Case 1	47	Male	0.58	19	13.9	4.1	Right hemicolectomy
Case 2	38	Female	0.32	25	13.1	2.9	Right hemicolectomy
Case 3	52	Male	0.21	12	11.7	4.2	Total colectomy
Case 4	63	Male	0.63	11	14.2	4.22	Right hemicolectomy
Case 5	64	Male	0.34	2	13.7	4.6	Sigmoid resection
Case 6	88	Female	0.32	12	11.1	3.7	Sigmoid resection
Case 7	33	Female	1.41	21	11.5	3.3	Right hemicolectomy
Case 8	82	Male	0.12	15	11.4	3.9	Right hemicolectomy
Case 9	81	Male	0.615	14	12.3	3.4	Sigmoid resection
Case 10	34	Male			15.8	4.8	Right hemicolectomy
Case 11	31	Male	0.34	2	14.7	4.3	Transverse colon segmentary resection
Case 12	26	Male	0.32	2	15.5	4.39	Right hemicolectomy
Case 13	74	Female	0.22	8	13.7		Sigmoid resection
Case 14	53	Female	2.09	10	11.8	2.9	Total colectomy
Case 15	86	Male	0.22	12	12.9	3.6	Right hemicolectomy
Case 16	38	Male	0.38	3	15.5	4.3	Right hemicolectomy
Case 17	46	Male	0.62	9	14.5	4.4	Right hemicolectomy
Case 18	38	Male	1.56	14	13.9	4.1	Right hemicolectomy
Case 19	36	Male	0.8	16	11.6	3.7	Right hemicolectomy
Case 20	61	Female	1.1	75	12.2	3.8	Sigmoid resection

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difference was detected between 1st month and 3rd month (1st month vs. 3rd month; p=0.009), but no difference was detected between 1st month and 2nd month (1st month vs. 2nd month; p=0.06) and no difference between 2nd and 3rd months (2nd month vs. 3rd month; p=0.954) was observed. When social relation scores were examined no statistically significant difference was observed for any of the 3rd month follow up (1st month vs. 2nd month; p=0.88), (2nd month vs. 3rd month; p=0.72), (1st month vs. 3rd month; p=0.25). In the 3 months comparison of general health perception scores of probiotic treatment given patients, no significant difference was detected (1st month vs. 2nd month; p=0.181), (2nd month vs. 3rd month; p=1), (1st month vs. 3rd month; p=0.126). The SF-36 life quality analysis is given in Table 1. In our study which included 20 patients, albumin, hemoglobin, CRP, sedimentation values with the age and gender was given in Table 2.

When the 3 months-Beck depression scores were examined, no significant difference was detected (1st month vs. 2nd month; p=0.363), (2nd month vs. 3rd month; p=0.167), (1st month vs. 3rd month; p=1).

When the patients were assessed considering the defecation numbers; while the daily average defecation number for the 1st month was 2,63 then in the 3rd month average decreased to 2.26 times, but no significant difference was recorded (p=0.37).

Discussion

Although the advanced methods in developed surgical techniques have decreased the morbidity and mortality rates currently, postoperative surgical infections still appear to be important reasons for hospital stay nowadays.[15,16] Probiotic therapy including beneficial microorganisms seems to be a new approach for treatment especially to prevent harmful pathogens emerging postoperatively by providing beneficial probiotic microorganisms.[17]

According to our literature scanning, there is only one study searching for the effects of probiotics on the patients during postoperative convalescence period,[18] but no such a study in our country yet. The difference of our study from the one in literature is that; the patients with malignancy were not included in our study to prevent the unexpected error in case they could take chemotherapy which would suppress the effectiveness of the probiotics. Also in our study, the probiotic treatment was started after stopping the postoperative antibiotic therapy. By this way, it was aimed to gain back the previous normal microbiota by the given alive bacterial flora members.

In this study, although we have detected that probiotic therapy couldn't be enough to correct the previous depression condition after 3 months follow up, a statistically significant improvement was provided for some of the 8 parameters of life quality.

Pellino et al.[18] have compared the effect of early postoperative probiotic+antibiotic treatment with placebo+antibiotic treatment. In that study, life quality was used as the comparison scale, and social life function scores were found to be higher in the probiotic taking group. Although the colon cancer cases having Duke D score were excluded in the study, no enough information was given about the diagnosis of the operated patients. In our study, in order to provide a clear analysis of probiotic treatment, cancer cases were excluded so none of the patients had got any chemotherapy during the study period. Also in our study, no difference was observed between the social relationship scores of before treatment values and after treatment values, so it was concluded that probiotic treatment couldn't have changed social relationship.

Mizuta et al.[19] compared the Bifidobacterium treatment group with the control group, in early postoperative period after initial treatment. In that study, cases with colorectal cancer were included and the response to postoperative chemotherapy was searched. The general condition of patients was observed starting from the postoperative 1st day to the postoperative 14th day. Especially in the analysis of feces of patients who had taken probiotics, the amount of beneficial actinobacterium was found to be more than the control group. Besides, inflammatory activity was observed less in probiotic taking patients. Our study followed a 3 months period resembling the study of Mizuta et al.[19] and does not include any stool analysis. Meanwhile in our study, a patient group who did not take chemotherapy was investigated and it was observed that life quality improved but no statistically significant improvement was seen about depression conditions.

In our study, a statistically significant improvement was detected in PFs including simple daily activities. The capabilities of making daily home activity of patients were improved from easy to hard works in 4-week periods. ER scores with work and daily life mood were examined and a significant improvement was detected in our study. Also the pain was observed to be decreased by the time in probiotic taking patients. Mental condition was detected to be significantly improved in next later period, although there has been no improvement during the early phase in postoperative period. It is possible to say the same condition

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about the liveliness points which were defined as feeling energetic oneself. The limiting factors in our study were the lack of control group and assessment with a small group including 20 patients.

Conclusion

As a result, Bifidobacterium and Lactobacillus species being members of normal intestinal flora might improve life quality by the time in patients with colon resection, whereas they have no affect to cause a change in depression status of the cases. It shall be beneficial to perform further studies for assessment of probiotic agents by avoiding wide spectrum antibiotics and chemotherapy which may be harmful on probiotics given, so these kinds of agents could be evaluated more clearly.

Ethics

Ethics Committee Approval: The study was approved by the Mersin University Faculty of Medicine Ethics Committee (no: 2014/217-25.09.2014), Informed Consent: Detailed information was given to patients before the procedure and informed consent was taken.

Peer-review: Internal peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: Bahattin Özlü, Concept: Memduh Şahin, Design: Tahsin Çolak, Data Collection or Processing: Memduh Şahin, Özgür Türkmenoğlu, Analysis or Interpretation: Memduh Şahin, Bahattin Özlü, Tahsin Çolak, Literature Search: Bahattin Özlü, Writing: Memduh Şahin and Tahsin Çolak.

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