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ORIGINAL ARTICLE / ÖZGÜN MAKALE

Effect of Changing Patient's Position During Colonoscopy to the Colonoscopy Time, Ileal Intubation Rate and Number of Polyps

Kolonoskopi Sırasında Hasta Pozisyonunun Değiştirilmesinin Kolonoskopi Süresi, İleal Entübasyon Oranı Ve Polip Sayısına Etkisi

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Abstract

Objective: Colonoscopy is universally considered as the conventional tool for the identification and removal of adenomatous polyps. The aim was to evaluate the effect of position change on the cecal and ileal intubation rates and the detection rate of polyps. In this way, it is aimed to accelerate the colonoscopy procedure time and increase its sensitivity.
Methods: The study included 943 patients aged between 17 and 90 years presented for a diagnostic colonoscopy at our hospital surgery clinic from January 2008 to December 2018.
Results: The results indicated significantly lower median cecal and ileal intubation time and higher polyps detection rate owing to change in the patient's posture to supine than in the left lateral position during colonoscopy procedure ($p<0.0001$). Moreover, cecal ($p<0.0001$) and ileal ($p=0.001$) intubation time was negatively correlated with the number of polyps detected. The age of the participating patients was the demographic factor found to be positively correlated with the number of polyps detected ($p<0.0001$). Furthermore, changing the patient's posture to supine led to an 11% increase in the polyp detection rate in the cecum, ascending colon, and hepatic flexure combined regions ($p<0.0001$). The odds of detection of polyps in this region were 2.11 (95%CI, 1.60-2.78) times higher in supine posture compared to the left lateral position.
Conclusion: The above findings strengthen the relevance of the position of the patient in the polyp detection rate during colonoscopy procedures.

Keywords: Colonoscopy, Cecal Intubation Rate, Ileal İntubation Rate, Colorectal Cancer, Left Lateral Position, Supine Position

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Öz

Amaç: Kolonoskopi, adenomatöz poliplerin tanımlanması ve çıkarılması için tüm dünyada sık kullanılan yöntem olarak kabul görmektedir. Çalışmamızda, pozisyon değişikliğinin çekal ve ileal entübasyon oranlarına ve polip saptanma oranlarına etkisinin değerlendirilmesi amaçlandı. Bu sayede kolonoskopi işlem süresinin hızlandırılması ve hassasiyetinin arttırılması hedeflenmektedir.

Yöntem: Çalışmaya Ocak 2008 ile Aralık 2018 tarihleri arasında hastanemiz cerrahi kliniğine tanısal kolonoskopi için başvuran 17-90 yaş arası 943 hasta dahil edildi.

Bulgular: Sonuçlar, kolonoskopi işlemi sırasında sol lateral pozisyona göre hastanın sırtüstü duruşundaki değişiklik nedeniyle ortalama çekal ve ileal entübasyon sürelerinin anlamlı derecede daha düşük olduğunu ve polip saptama oranının daha yüksek olduğunu saptadık ($p<0.0001$). Ayrıca çekal ($p<0.0001$) ve ileal ($p=0.001$) entübasyon süreleri ile saptanan polip sayısı arasında negatif korelasyon olduğu görüldü. Dahil edilen hastaların yaşı ile tespit edilen polip sayıları arasında pozitif korelasyon olduğu izlendi ($p<0.0001$). Ayrıca, hastanın duruşunu sırtüstü olarak değiştirmek, çekum, çıkan kolon ve hepatik fleksur kombine bölgelerinde polip saptama oranında %11'lik bir artışa yol açtığı tespit edildi ($p<0.0001$). Bu bölgede polip saptanma olasılığı, sırtüstü pozisyonda sol yan pozisyona göre 2,11 (%95 GA, 1,60-2,78) kat daha yüksek olarak belirlendi.

Sonuç: Yukarıdaki bulgular, kolonoskopi işlemleri sırasında polip saptanma oranında hastanın pozisyonunun önemini güçlendirmektedir.

Anahtar Kelimeler: Kolonoskopi, Çekal Entübasyon Oranı, İleal Entübasyon Oranı, Kolorektal Kanser, Sol Yan Pozisyon, Sırtüstü Pozisyon

INTRODUCTION

Colonoscopy is a technique widely used in patients with disorders in the abdomen and is a critical feature of all screening initiatives for colorectal cancer (CRC). It finds great value in the detection and prevention of CRC and holds considerable application in non-neoplastic disorders as well. The advantages incurred by colonoscopy comprises of complete colon visualisation, polyp identification and elimination, and extensive lesion examination of the tissue. In addition, polypectomy colonoscopy reduces CRC incidence by up to 90 % (1).

The relative effectiveness of colonoscopy screening relies on many factors such as bowel preparation, cecal intubation rate (CIR), time of extraction, and rate of adenoma diagnosis. Cecal intubation is characterised as progressing the tip of the colonoscope to a spot close to the ileocecal valve so that the entire cecal caput, such as the medial wall of the cecum, can be visualised. Hence, it is imperative to perform a full colonoscopy to reduce the level of polyp in all colon segments. The existing guidelines recommend benchmarks for positive cecal intubation levels of at least 90% for all colonoscopies and at least 95% for colonoscopy screening, recognizing that most clinicians would surpass these minimum requirements (2,3).

For certain cases, an endoscopist may encounter trouble progressing through the colon, leading to incomplete colonoscopy. Patient-related as well as technical attributes contribute to the occurrence of numerous problems in clinical practice leading to incomplete colonoscopy (4). Specific patient factors include improper preparation of bowel, pain and sensitivity, low total body mass, sex (female) and age (young) while diverticulosis, prior surgical adhesions, angulation or bowel loop fixation, and inadequate sedation are included under the technical factors (5). Therefore, colonoscopy can trigger uncommon but severe complications and colonoscopies that are inappropriately operated are related

to larger interval rates in the incidence of cancers (6).Colonoscopy is a technically demanding and complicated technique that requires preparation and experience to ensure a positive outcome. There are multiple colonoscopy training strategies for efficient intubation and removal of the cecal, along with quality assessment measures for colonoscopy skill quality. The various techniques utilised for the process of colonoscopy include magnetic navigation, simulation models, double-balloon colonoscopy (DBC) and numerous auxiliary techniques such as abdominal compression, changing the position of a patient, and water immersion colonoscopy.

In technically difficult circumstances, magnetic navigation systems have greatly enhanced the colonoscopy efficiency of clinicians. Compared to conventional colonoscopy, this technique confers with a lower chance of colonoscopy failure and reduced cecal intubation time (7). The colonoscopy training model and colonoscopy simulator type II, the two major physical simulation techniques, are widely used worldwide. Additionally, multiple computer-simulated endoscope programs also come into play, which includes Simbionix Simulator GI Mentor, LM-107 Simulator Type II, Olympus Colonoscopy Simulator Endo TS-1, and AccuTouch Endoscopy Simulator CAE Healthcare. The initial step of the learning process for colonoscopy is accelerated by training on simulators, with significantly diminished pain in the patients subsequent to colonoscopic procedures. The major effect of simulators on clinical dealings in the upcoming years also needs to be monitored (8).

DBC is considered as an effective procedure for cecal intubation following an initial incomplete colonoscopy. Reports suggest a higher CIR as compared to the conventional colonoscopy, which suggest that it may be a productive educational option for cecal intubation, minimising the training time and eventually reduce the call for suitable training in colonoscopy procedures (9). Abdominal compression may be initiated on the abdomen segment where a loop is anticipated, however, the air insufflation technique keeps the colon lengthy and protracted making it cumbersome to progress effectively with the colonoscope. In such a scenario, water immersion colonoscopy helps in avoiding over-distension of the intestine with air. Although there are numerous encouraging results related to the efficiency of water immersion colonoscopy, a recent study comparing water infusion with air insufflation during colonoscopic insertion revealed that water infusion did not boost the CIR compared to air insufflation. However, the adenoma detection rate (ADR) was observed to be marginally higher and abdominal pain associated with the procedure was decreased by water infusion technique (10).

Repositioning the patient in the right lateral decubitus or supine position promotes and allows the transition from the angulated splenic flexure to the mid-transverse colon. The left side location is suitable for the intuition of the endoscope from the middle transverse colon to the distal ascending colon, while the left side or supine location is useful for advancing the endoscope from the distal ascending colon. However, the above-mentioned statement is debatable due to various inconclusive studies in the literature (11-13).

Detecting and extracting polyps at screening colonoscopy is critical for successful colon cancer prevention and accounts for reliable risk stratification to notify accurately projected monitoring intervals. The ADR has surfaced as the principal quality colonoscopy performance measure and any new technique that enhances ADR is absolutely entitled. Numerous novel ADR-enhancing tools and technologies have been addressed in recent times, but few have demonstrated enduring functional benefits. Given the search for innovative technologies, basic elements of colonoscopic technique should not be ignored or underrated when it comes to polyp detection (14).

This piece of research study aims to detect and treat premalignant lesions. There is evidence to substantiate the premise that systematic change of position on withdrawal significantly improves the presentation of the mucosa and polyp identification, which are termed as the core theme of a high-quality examination (13). Moreover, the quality and efficiency of the process are determined based on the speed of the process and the number of polyps detected (14). Therefore, in this study, we aimed to investigate the effect of position change of patients during a colonoscopy on time of reaching the cecum, ileal intubation rate, and the number of polyps detected.

METHODS

A total number of 1688 patients aged between 17 and 90 years presented for a diagnostic colonoscopy at our hospital surgery clinic from January 2008 to December 2018 were invited to participate in the study. We excluded patients with insufficient bowel cleansing, presenting without polyp, morbid obesity, late adhesions due to recurrent abdominal surgery, or age <16 years. All patients were handed over the informed consent form, and the study started once the patients gave the written informed consent form. The study was approved by S.B.Ü. İstanbul Education Research Hospital Clinical Research Ethics Committee, 07/02/2020, no:2161.

The patients were prepared with a standard colonoscopy preparation diet for the process of colonoscopy. Sodium phosphate was used as a laxative. All patients underwent colonoscopy under anaesthesia with a protocol.

Colonoscopy was started in the left lateral position in all patients. The examination was also performed from the beginning of the colonoscopy until the cecum was reached. Polypectomy was applied to the detected polyps and the procedure was continued. When the hepatic flexure was reached, a group of patient's was placed in a supine position. Time to reach the cecum and ileum intubation were recorded. On the way back, the examination continued in the same way. Polypectomy was performed on detected polyps. The removed polyps were divided into groups according to the regions where they were removed and sent for pathological examination.

The patients were divided into two groups, with a change of position and no position change. These two groups were analysed for parameters such as the time to reach the cecum, the duration of the ileum intubation, the number of polyps detected, the polyps' detection site, and the pathological grade of the polyps.

Statistical analysis

All statistical analyses were performed using the SPSS program (version 21.0, SPSS Inc., Chicago, IL). A normality test was performed using the Shapiro-Wilk test for continuous variables. Categorical and continuous variables are presented as percentages and median ± interquartile range (IQR), respectively. Categorical variables were analysed using Pearson's chi-square test. Comparisons of continuous variables were carried out using the Mann-Whitney U-test. Spearman correlation was used to estimate the strength of association between variables. A p-value of <0.05 was considered statistically significant for all analyses.

RESULT

We assessed a total number of 1688 patients who underwent colposcopy during the study period. Out of these, 745 patients were ineligible based on our exclusion criteria (insufficient bowel cleansing, n=154; presenting without polyp, n=330; morbid obesity, n=98; late adhesions due to recurrent abdominal surgery, n=38; age <16 years, n=125), and 943 were analysed. There were 402 females and 541 males with an average age of 59 ± 18 years (range 17-90 years). Following the treatment protocol, the patients were divided into 2 groups with 542 patients operated in the left lateral position and 401 patients in the left lateral to the supine position (Table 1). The cecal and ileal intubation time was 15 ± 6 min and 3 ± 2 sec, respectively. The details of characteristics of polyps and carcinomas detected during the procedure of colonoscopy are presented in Table 2.

Table 1. Baseline patient characteristics

Characteristics	**n=943**	
Sex	**n**	**%**
Male, n (%)	541	57.4
Female, n (%)	402	42.6
Age (years)		
Median ± IQR (min-max)	59 ± 18 (17-90)	
Patient's posture change		
Left lateral position, n (%)	542	57.5
Left lateral to supine position, n (%)	401	42.5
Cecal intubation time (min)		
Median ± IQR (min-max)	15 ± 6 (7-32)	
Ileal intubation time (sec)		
Median ± IQR (min-max)	3 ± 2 (0-6)	

In the study, it was observed that there were a statistically significant between-group differences in cecal and ileal intubation time and the number of polyps detected owing to change in the patient's posture to supine

during colonoscopy procedure (p<0.0001; Table 3).The median cecal and ileal intubation time was significantly lower with a higher number of polyps detected in supine than in the left lateral position. Additionally, cecal and ileal intubation time was found to be negatively correlated with the number of polyps detected, which indicated the fact that lower cecal (p<0.0001) and ileal (p=0.001) intubation time increased the chance of detecting a higher number of polyps during colonoscopy (Table 4).

Table 2. Characteristics of polyps and carcinomas detected during colonoscopy

Characteristics	n	%
Polyps		
Hyperplastic polyp	481	36.0
Low-Grade Dysplasia	621	46.5
Intermediate-Grade Dysplasia	21	1.60
High-Grade Dysplasia	212	15.9
Carcinoma	55	5.83
Polyp location		
Cecum	112	11.9
Ascending colon	85	9.0
Hepatic flexure	107	11.3
Transverse colon	139	14.7
Splenic flexure	54	5.7
Descending colon	114	12.1
Sigmoid colon	382	40.5
Rectum	342	36.3
Carcinoma location		
Cecum	4	0.4
Ascending colon	7	0.7
Hepatic flexure	1	0.1
Transverse colon	2	0.2
Splenic flexure	1	0.1
Descending colon	4	0.4
Sigmoid colon	13	1.4
Rectum	23	2.4

Furthermore, the relation between the number of polyps detected and cecal and ileal intubation time with age was studied. The obtained data confirmed a positive correlation between age of the participating patients and number of polyps detected (p<0.0001; Table 5).

Table 3. Impact of changing patient's posture on cecal and ileal intubation time and number of polyps detected

Characteristics	Position during colonoscopy		P
	Left lateral	Left lateral to supine	
Cecal intubation time (min)	17 ± 8	12 ± 6	<0.0001
Ileal intubation time (sec)	3 ± 2	2 ± 1	<0.0001
Number of polyps	1 ± 0	1 ± 1	<0.0001

Data presented as Median ± IQR

Table 4. Association of number of polyps detected with cecal and ileal intubation time

Characteristics	r*	p
Cecal intubation time (min)	-0.27	<0.0001
Ileal intubation time (sec)	-0.12	0.001

*Spearman's correlation coefficient

Table 5. Association of age with number of polyps detected and cecal and ileal intubation time

Characteristics	r*	p
Number of polyps	0.24	<0.0001
Cecal intubation time (min)	-0.004	0.90
Ileal intubation time (sec)	0.001	0.98

*Spearman's correlation coefficient

The effect of the patient's posture on polyp detection rate (the number of patients with ≥ 1 polyp detected in each colon segment) during colonoscopy was also studied and the details are presented in Table 6. It is noteworthy to state that as compared to the position of the patients in the left lateral position, changing the patient's posture to supine led to an 11% increase in the polyp detection rate in the cecum, ascending colon, hepatic flexure combined regions(p<0.0001). The odds of detection of polyps in the combined regions were 2.11 (95%CI, 1.60-2.78) times higher in supine posture compared to the left lateral position (p<0.0001).

Table 6. Impact of changing patient's posture on polyp detection rate during colonoscopy

Colon segment	Position during colonoscopy				*p*	OR (95%CI)
	Left lateral		Left lateral to supine			
	n	%	n	%		
Cecum	52	46.4	60	53.6	0.012	1.66 (1.12-2.46)
Ascending colon	34	40.0	51	60.0	0.001	2.18 (1.38-3.43)
Hepatic flexure	51	47.7	56	52.3	0.029	1.56 (1.04-2.34)
Transverse colon	70	50.4	69	49.6	0.07	1.40 (0.98-2.01)
Splenic flexure	23	42.6	31	57.4	0.023	1.89 (1.09-3.30)
Descending colon	49	43.0	65	57.0	0.001	1.95 (1.31-2.89)
Sigmoid colon	215	56.3	167	43.7	0.54	1.09 (0.84-1.41)
Rectum	166	48.5	176	51.5	<0.0001	1.77 (1.35-2.32)
Cecum + Ascending colon + Hepatic flexure	137	45.1	167	54.9	<0.0001	2.11 (1.60-2.78)

OR: odds ratio

DISCUSSION

To date, considerable attention has been placed on the type of equipment and other technical advancements for maximising efficiency and performance. Efforts to enhance colonic visualisation and polyp detection, however, will also require that colonoscopists concentrate on basic and cost-effective techniques (15). Variation in the position of the patient is a cost-effective tool for improving outcomes like the detection rate of a polyp (16). The modification of a patient's position is complemented by the colon's intra-abdominal motion and fluid and gas intraluminal motion. For decades now, radiologists have been using these refinements to maximise views during examination procedures (17). It has been implied that changing the position of the patient to expose the colon segments to the top of the abdomen enhances luminal distension and thus detects lesions through colonoscope withdrawal.

The primary objective of this study was to examine the effect of position change of patients on cecum and ileum intubation time along with the number of polyps detected during the procedure. Although changes in position during the removal of the colonoscope were suggested to enhance the luminal view, the paucity of factual evidence has hampered quite a comprehensive deployment of the above-mentioned technique (18). Our data demonstrate that there were statistically significant differences between the observed groups in cecal and ileal intubation time and a number of polyps detected as a result of the change in the patient's posture during colonoscopy. The median cecal and ileal intubation time was significantly lower in supine posture than in the left lateral position. The change in the patient's posture to supine also allowed the detection of a significantly higher number of polyps than in the left lateral position. The most probable explanation, with the gravitational forces in motion, can be due to the displacement of the air column at the cecal base, thereby allowing a higher detection rate of the polyps. This change in position helped put certain segments of the colon into a position within the abdomen, which allowed optimum viewing. It was also associated with increased colon distension (inflation), thus enabling better visualisation. The detection of polyps was more if the patient remained supine (19).

In addition, cecal and ileal intubation time was observed to be negatively correlated with the number of polyps detected, which implied that lower cecal and ileal intubation time increased the chance of detecting a higher number of polyps during a colonoscopy. A positive correlation between age of the participating patients and the number of polyps detected was also observed. The results corroborated with the findings reported in a study, which

involved more than 12,000 colonoscopies showing that the gender and age of the patients, the quality of bowel preparation, the level of continuing medical education of endoscopists, and the quality of endoscopic tools were factors linked to the ADR (20).

We also observed that changing the patient's posture to supine from the left lateral position yielded an 11% enhancement in the polyp detection rate majorly in the region of the cecum, ascending colon, and hepatic flexure combined regions. In the present analysis, luminal distension in the supine position was classified adequate having the presumption that the rise in polyp detection resulted from increased luminal distension, this would suggest that the supine posture is still an effective strategy. Shift in dynamic position is logical as air naturally rises to the highest level. These shifts in position lead to improved distension with less air insufflation, fluid and debris removal, and flexure opening of tight angles. This strategy also helps to facilitate the insertion process. The patient needs to be sedated gently, however, so shifting from the left side to the supine position is straightforward, but shifting to the right side becomes more complicated. Another group of investigators carried out a randomised crossover trial and found that position change during removal in the procedures substantially enhanced the rate of polyp and adenoma detection (21). The study was further validated by a report supporting this in a randomised trial in which patients 1:1 were randomly allocated by the investigators to be tested either in the left lateral position during colonoscope withdrawal or in other positions. In the population observed, the ADR was enhanced by 9.8% in the transverse colon, splenic flexure, descending, and sigmoid colon (12). The major limitation of the present study was that it was conducted in a single centre. Multi-centric trials would add reproducibility of data followed by a good acceptance rate.

CONCLUSION

Our results indicate that an appreciable enhancement in the polyp detection rate was observed majorly in the region of the cecum, ascending colon, and hepatic flexure combined regions through simple position change techniques. Ultimately, a multicenter trial involving a larger cohort of endoscopists is envisioned to verify the generalizability of our data and to establish whether enhanced visualisation induced by the change of position leads to improvements in polyp detection rate with reduced precipitation reduced CRC.

Abbreviations

Adenoma Detection Rate (ADR)

Cecal Intubation Rate (CIR)

Colorectal Cancer (CRC)

Double-Balloon Colonoscopy (DBC)

InterQuartile Range (IQR)

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Conflict of Interest

The authors declare no conflict of interest

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Ethical Declaration

The study was approved by S.B.Ü. İstanbul Education Research Hospital Clinical Research Ethics Committee, 07/02/2020, no:2161.

Authorship Contributions

Concept: SS, RA, Design: RA, SS Supervising: RA, Financing and equipment: RA, SS Data collection and entry: RA, SS, Analysis and interpretation: RA, SS, Literature search: RA, SS Writing: RA Critical review: RA, SS

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ORIGINAL ARTICLE / ÖZGÜN MAKALE

Effects of Eucalyptus Essential Oil in Post-COVID Syndrome: A Pilot Study

Post-COVID Sendromunda Okaliptüs Uçucu Yağının Etkileri: Pilot Çalışma

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Abstract

Objective: Post-COVID syndrome is the persistence of signs and symptoms that develop during or after COVID-19 infection for longer than 12 weeks, which cannot be explained by an alternative diagnosis. This study aimed to examine the effects of eucalyptus (Eucalyptus globulus) aromatherapy oil on dyspnea, back pain, and anxiety in patients with post-COVID syndrome.
Methods: The study included patients diagnosed with post-COVID syndrome at the chest diseases outpatient clinic of Adana City Training and Research Hospital. Before and after eucalyptus oil application, as components of post-COVID syndrome, dyspnea was evaluated using the modified Medical Research Council (mMRC) scale, back pain using the Visual Analog Scale (VAS), and anxiety using the Beck Anxiety Inventory (BAI).
Results: A total of 15 individuals, of whom 11 were female (73.3%) and 4 were male (26.7%), were included in the study. The mean age of the patients was 45.7±10.7 years, and the mean body mass index was 24.7±3.4. The mean post-treatment values of mMRC, VAS, and BAI statistically significantly decreased compared to the pre-treatment evaluation.
Conclusion: Eucalyptus aromatherapy oil inhalation was found to be effective in recovery from post-COVID syndrome symptoms, such as dyspnea, back pain, and anxiety, which affect many people across the world and can cause labor and financial losses. Therefore, we recommend considering the use of this aromatherapy oil in the complementary treatment and follow-up of these patients.

Keywords: Post-COVID Syndrome, Eucalyptus Aromatherapy Oil, Dyspnea, Pain, Anxiety

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Öz

Amaç: Post covid sendromu Covid-19 enfeksiyonu sırasında veya sonrasında gelişen 12 haftadan uzun süren ve alternatif bir tanı ile açıklanamayan belirti ve semptomlardır. Çalışmamızın amacı post covid sendromunda nefes darlığı, sırt ağrısı, anksiyete üzerine okaliptus (Eucalyptus globulus) aromaterapik yağının etkilerini incelemektir.
Yöntem: Adana Şehir Eğitim ve Araştırma Hastanesi Göğüs Hastalıkları polikliniğinde post covid sendrom tanısı alan hastalara uygulama öncesi ve 4 hafta sonrasında post covid sendrom bileşenlerinden olan nefes darlığı semptomunun takibi amacı ile mMRC (Modifiye Medical Research Council) skalası, sırt ağrısının takibi için VAS ağrı skalası, anksiyete şiddeti takibi için Beck Anksiyete Ölçeği uygulandı. Veriler uygun veri tabanında analiz edildi.
Bulgular: Çalışmamıza 11'i kadın(%73.3) , 4'ü erkek (%26.7) olmak üzere toplam 15 kişi dahil edildi. Hastaların ortalama yaşı 45.7 (+- 10.7), VKİ 37 (+-4,4) idi. Tedavi öncesi ve sonrası mMRC, VAS, Beck anksiyete ölçeği değerlerinin ortalamaları karşılaştırıldığında istatistiksel olarak anlamlı düzeyde azalma saptandı.
Sonuç: Dünya üzerindeki birçok kişiyi etkileyen, işgücü ve mali kayıplara da neden olabilen post covid sendromu semptomlarından nefes darlığı, sırt ağrısı, anksiyete üzerine inhale okaliptus aromaterapik yağı iyileşmede etkili bulunmuş olup, bu hastaların tedavi ve takibinde göz önünde bulundurulması önerilir.

Anahtar Kelimeler: Post covid sendromu, okaliptus aromaterapik yağı, dispne, ağrı, anksiyete

INTRODUCTION

Due to the first pandemic of the 21st century, more than 633 million people across the world were diagnosed with coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus as of November 2022. Approximately six million cases resulted in death (1).

Many pharmacological treatments have been used since the beginning of the pandemic, but only few have been able to increase survival and prevent the development of sequelae or persistent symptoms. Unfortunately, even with no more new cases being reported and global vaccination implementation, the consequences of the COVID-19 pandemic will not be completely resolved. In particular, the long-term effective management of the effects of post-COVID syndrome is a challenge that requires increased awareness. Post-COVID syndrome, also known as long-term COVID, is defined as signs and symptoms consistent with COVID-19 that develop during or after active infection lasting for more than 12 weeks without any possible explanation by an alternative diagnosis (National Institute for Health and Care Excellence. SIGN . Royal College of General Practitioners COVID-19 Guideline Scope). Although the prevalence of post-COVID syndrome is not clearly known, symptoms persisting after the disease have been described, with an estimated rate of 13.7% according to the data of the UK Office for National Statistics (Prevalence of Ongoing Symptoms Following Coronavirus (COVID-19) Infection in the). Accordingly, post-COVID syndrome symptoms include fatigue, headache, dyspnea, joint and muscle pain, anxiety, cognitive impairment, depression, skin rashes, and gastrointestinal complaints (2).

In the acute and post-COVID syndrome process, numerous treatment options have been offered, and new treatments have been sought. During this period, as in the past, essential oils have also been utilized in terms of their aromatherapeutic effects. An example is eucalyptus oil, which has been

frequently used by various civilizations and communities across the world since ancient times. This is an essential oil obtained by steam distillation from the leaves of different eucalyptus species. It has a characteristic, aromatic, camphor-like odor, light yellow color, and refreshing and burning taste similar to camphor. This oil contains a large quantity (at least 70%) of 1,8-cineol (eucalyptol), α-pinene, phellandrene in very little amount, and other terpenes. When the antibacterial properties of *Eucalyptus globulus* essential oil were examined against 15 gram-positive and gram-negative bacteria, it was determined that this oil was very effective against *Bacillus anthracis*, *Bacillus subtilis*, and *Micrococcus glutamicus* (3). Various studies have also shown that due to their antiviral (4) and anti-inflammatory (5) activities, eucalyptus oil and its metabolites can be used against COVID-19 (6).

In this study, we examined the effects of *E. globulus* aromatherapeutic oil on the symptoms of post-COVID syndrome, such as dyspnea, back pain, and anxiety, representing the long-term effects of COVID-19.

METHOD

Male and female patients aged over 18 years, who presented to the physiotherapy and rehabilitation outpatient clinic of Adana City Training and Research Hospital with back pain and were followed up in the chest diseases outpatient clinic with the diagnosis of post-COVID syndrome, were included in the study. Patients with a history of any chronic disease, cancer, and infection and pregnant and lactating women were excluded from the study. The sample consisted of 15 patients that were recommended aromatherapeutic eucalyptus oil (*E. globulus*) (product license/permit approval code: 008821—Istanbul Provincial Directorate of Agriculture) due to post-COVID syndrome. The analysis of the components of *E. globulus* oil used by the patients is given in Table 1.

The patients were asked to prepare the essential eucalyptus oil mixture by dropping 1 ml of eucalyptus oil into 10 ml of fixed oil (olive oil). They were recommended to apply three drops of this mixture on the wrist and inhale it from a 2-cm distance for five minutes twice a day. Before and at four weeks after this application, the patients' post-COVID syndrome symptoms were evaluated using the modified Medical Research Council (mMRC) for dyspnea, the Visual Analog Scale for back pain, and the Beck Anxiety Inventory (BAI) for anxiety.

Table 1. Components of Eucalyptus globulus oil used by the patients

Component	Ratio (%)
1,8-Cineole	*73.687*
Alpha-Pinene	*16.891*
Trans-pinocarveol	*1.336*
P-cymene	*1.330*
Alpha-terpineol	*0.599*
Beta-myrcene	*0.100*
Gamma.-Terpinene	*0.309*
l-Phellandrene	*0.154*
Isovaleric acid, isopentyl ester	*0.132*
2-Ethylfuran	*0.411*
Beta-Pinene	*0.364*
Alloaromadendrene	*1.621*
Alpha-terpinolene	*1.154*
Aromadendrene	*0.314*
4-terpineol	*0.262*
Trans-p-Mentha-1(7),8-dien-2-ol	*0.131*
Alpha gurjunene	*0.258*
Ledene	*0.792*
Viridiflorol	*0.160*

mMRC questions the perception of dyspnea during activities of daily living from a scale of 0 indicating no dyspnea to 4 indicating severe dyspnea (7). The VAS pain score is evaluated from 0 (no pain) to 10 (worst pain) (8). BAI consists of 21 questions used to determine the level of anxiety experienced within the past week. A score of less than 21 points in this scale indicates mild anxiety, 22-35 points moderate anxiety, and 35 points severe anxiety (9).

Statistical analyses were performed using SPSS v. 25.0 software package. Whether the data were suitable for a normal distribution was evaluated with the Shapiro-Wilk test. The mean and standard deviation values of age, gender, and body mass index (BMI) were determined using descriptive analysis methods. The pre- and post-treatment values were interpreted using the Wilcoxon

and Paired Sample T test. The effect size was calculated according to the test used (10). Values with a P value of less than 0.05 were considered statistically significant.

RESULTS

A total of 15 individuals, of whom 11 were female (73.3%) and 4 were male (26.7%), were included in the study. The mean age of the patients was 45.7 ± 10.7 years, and the mean BMI was 24.7±3.4 (Table 2). When the results of the mMRC scale used to evaluate dyspnea were compared before and after treatment, it was observed that there was a statistically significant decrease after treatment ($p < 0.001$). In BAI, the decrease in the post-treatment scores was statistically significant compared to the pre-treatment evaluation ($p < 0.001$). Using VAS, the post-treatment back pain of the cases was also determined to statistically significantly decrease compared to the baseline ($p < 0.001$). As a result of the statistical analysis, the effect of the intervention was found to be very large for mMRC, very large for VAS, and medium for BAI. The results are shown in Table 3.

Table 2. Demographic Characteristics of Patient

		n	%
Sex	Male	4	26.7
	Female	11	73.3
		X̄±S.D	
Age		45.7±10.7	
BMI		24.7±3.4	

Table 3. Symptom evaluation of the patients before and after treatment

	Pre-treatment		Post-treatment			
	X̄±S.D	**Median (IQR)**	**X̄±S.D**	**Median (IQR)**	***P* value**	**Effect Size**
mMRC		2 (1)		0 (1)	< 0.001*	0.95ø
VAS	6.26±1.90		2.60±1.45		< 0.001**	1.84øø
BAI	37.33±14.74		25.86±13.64		< 0.001**	0.74øø

mMRC: Modified Medical Research Council, **VAS:** Visual Analog Scale, **BAI:** Beck Anxiety Inventory
*Wilcoxon Signed Rank Test, **Paired Samples T Test
ø Effect Size (r): 0.1-0.3: small, 0.3-0.5: medium, 0.5≤ large effect, øø Effect Size (Hedge's g): 0.2: small, 0.5: medium, 0.8: large effect

DISCUSSION

Due to the side effects of pharmacological agents used in diseases, there has been an increasing interest in aromatherapy, which is one of the complementary medicine methods and continues to be the subject of many studies.

Monoterpene 1,8-cineol (eucalyptol) is the main component of *Eucalyptus* species, a frequently used aromatherapy plant, is known for its anti-inflammatory, antioxidant, bronchodilator, antiviral, antimicrobial, analgesic, and anxiolytic effects. The antiviral, anti-inflammatory, and mucolytic mechanisms of 1,8-cineol are mediated through the induction of interferon regulatory factor 3. With these properties, has been used for many years in the treatment of chronic obstructive pulmonary diseases and asthma (11,12). Furthermore, M pro inhibitors, which are important for coronavirus replication, have become a promising research topic for the control of COVID-19, with research suggesting that essential oil components, especially 1,8-cineol can be used in the treatment of COVID-19 as a potential inhibitor without toxicity (13). Consistently, in the current study, after eucalyptus aromatherapy oil inhaler application, a statistically significant improvement was observed in mMRC measurements performed to evaluate the level of dyspnea, which also provides information about lung health.

In the content of eucalyptus aromatherapeutic oil, alpha-pinene and 1,8-cineol are antioxidants with radical scavenging activity. 1,8-cineol reduces inflammation and pain by inhibiting cytokine release from T-lymphocytes (14). In a randomized controlled study evaluating 70 patients diagnosed with rheumatoid arthritis, 1 ml of eucalyptus oil was administered to one group of patients through inhalation for three times a day for five minutes for one month, and an improvement was observed in the pain

severity (P < 0.05) and quality of life scores of this group compared to the other group that inhaled a placebo (P < 0.001) (15). In a study on rats, the analgesic activity of eucalyptus essential oil was considered to be related to the μ-opioid pain pathway, and its use in the treatment of somatic, inflammatory, and visceral pain was recommended (16). Similarly, in our study, the VAS scores of back pain, a commonly observed symptom in post-COVID syndrome, decreased after four weeks of eucalyptus oil application.

Due to its lipophilic property, 1,8-cineol can cross the blood-brain barrier and affect neuronal enzyme and receptor activities in the central nervous system (17). 1 Studies have shown that 1,8-cineol can be used in the treatment of anxiety by inhibiting the acetylcholinesterase activity that catalyzes the hydrolysis of acetylcholine (18). In a randomized controlled clinical study investigating the effect of eucalyptus aromatherapeutic oil inhalation on anxiety before selective nerve root block injection in 62 patients, there was a significant improvement in the anxiety level of the 1,8-cineol inhalation group compared to the control group, and eucalyptus aromatherapy oil was recommended to reduce preoperative anxiety (19). This is supported by our study revealing a significant decrease in the BAI anxiety scores of the patients after eucalyptus inhalation. As a result of the statistical analysis, the effect of the intervention in our study was found to be very large for mMRC and VAS, medium large for BAİ.

The limitations of this study include the small number of patients and the absence of a control group.

CONCLUSION

Eucalyptus aromatherapy oil inhalation was found to be effective in recovery from post-COVID syndrome symptoms, such as dyspnea, back pain, and anxiety, which affect many people across the world and can cause labor and financial losses. Therefore, we recommend the use of this aromatherapy oil in the complementary treatment and follow-up of these patients. There is a need for randomized controlled clinical studies with a larger sample size.

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Conflict of Interest

Conflict of Interest None.

Support Resources

No financial support was used by authors during this study

Ethical Declaration

Ethics committee approval was not obtained because it was a pilot study and Helsinki Declaration rules were followed to conduct this study.

Authorship Contributions

Concept: GYÖ, SBS, Design: SBS, Supervising: GYÖ, Financing and equipment: SBS Data collection and entry: SBS, GYÖ, Analysis and interpretation: SBS, Literature search: GYÖ.

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CASE REPORT

Bell´s Palsy After Astra Zenica COVID-19 Vaccination

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Abstract

We present a case of peripheral facial palsy developing after the first dose of AZD1222, Astra Zeneca`s COVID-19 vaccine. A 31- year-old female received her first dose of AZD1222 vaccine against COVID-19. Later the same day, she developed swelling around her neck and head. The next day, she woke up with hanging eyelid, hanging mouth and loss of sensibility on the left side of her face- indications of peripheral facial paralysis. She later on developed hyperesthesia on the upper extremities. Before vaccination, the patient was healthy and had no history of neurological disease. She fully recovered from the paresis after 2-3 days. Five months after she received her first and only dose of the vaccine, she still complains of severe hyperesthesia in her upper extremities. There have been several international case reports of Bell´s palsy after COVID-19- vaccination, but Bell´s palsy is not yet a confirmed adverse effect of any COVID-19 vaccine. The aim of this case report is to raise awareness about Bell´s palsy as a possible adverse effect of Astra Zeneca´s COVID-19 vaccine.

Keywords: Post Covid Vaccine, Bells Palsy, Immune Reaction

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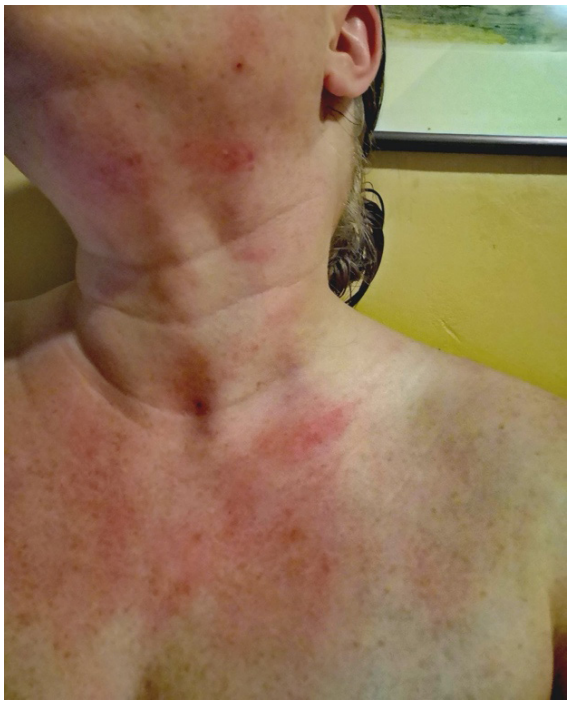
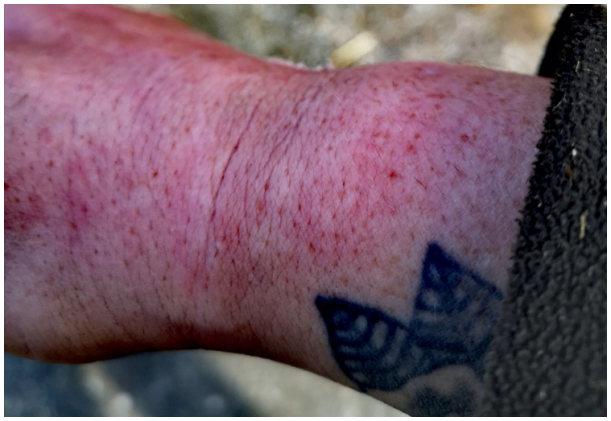
BACKGROUND

An otherwise healthy woman in her 30s was vaccinated against COVID-19 with Astra-Zeneca´s AZD1222 vaccine. The day after, she developed peripheral facial paralysis or Bell´s palsy, followed by numbness and hyperesthesia in her right arm. Before vaccination, she was in good health and has never experienced any paralysis or sensory disturbances. At clinical control 5 months later, she still suffers from hyperesthesia in the upper extremities, especially on the right side, where touch causes discomfort. She has also developed skin changes (hematomas) in warm conditions, but the initial facial paralysis spontaneously regressed within one day.

CASE PRESENTATION

A 31-year-old woman working as a nursing assistant was referred to the local hospital by her General Practice (GP) due to symptoms following vaccination with AZD1222 against COVID-19. Apart from hip dysplasia, this patient was previously healthy and did not use any medication. On the same day after the first dose of vaccine, she developed skin rash resembling a bruise on her upper body (Figures 1 and 2) and swelling around her neck and face. The next day, she woke up with fever and the clinical picture of right peripheral facial nerve palsy (Figure 3).





Figures 1 and 2 : shows bruise on her upper body and swelling around the face and neck. (Taken by the patient and used with consent from the patient)

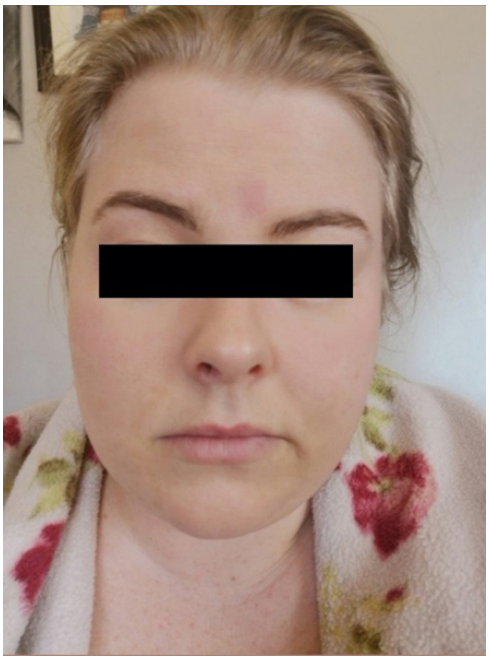


Figure 3- shows right peripheral facial nerve palsy: affection of the forhead, the eye and the corner of the mouth. (Taken by the patient and used with consent from the patient)

As the figures show, the forehead, the eye, and the corner of the patient´s mouth were affected on the right side. In addition, the patient had blurred vision on the affected eye. Shortly after, the swelling on the right side of her face worsened, and there was numbness and weakness of the right arm for a few minutes. Worsening episodic numbness continued afterwards that she had to shake her arm to relieve symptoms. The patient has never experienced similar symptoms before. Paresis of the face completely regressed spontaneously after 2-3 days, without the patient seeing a doctor or undergoing treatment. The patient first

consulted her GP 6 weeks after the onset of symptoms because of persistent skin changes or bleeding on the upper body, especially with hot showers or physical activity (Figures 1 and 2), and was referred to the thrombosis and hemostasis clinic because of suspicion of bleeding disturbances. Based on the images the patient brought to the consultation, peripheral facial nerve palsy was suspected. The patient was then referred for neurological examination and simultaneously underwent blood work up to check for an underlying myeloproliferative disease (MPN) based on the high Hb, mild leukocytosis, and heat- related skin changes. Neurological anamnesis and examination revealed no suspicion of a central cause of paresis or an ischemic cerebral vascular event. Hyperesthesia was noted on the right side, in addition to mildly decreased strength in the hip and knee joints. The latter is probably due to the patient´s known hip dysplasia and tendonitis.

Due to the patient´s increased and marginal leukocytosis and elevated hemoglobin, control blood samples, including BCR-ABL, JAK2, exon12, CALR and MPL mutation samples, were taken to the molecular pathology department of OUS to rule out MPN and chronic myeloid leukemia (CML). She was thoroughly examined physically both by a hematologist and a neurologist. There was no evidence of thrombosis or underlying blood disease, including negative mutation tests for MPN and CML, normal coagulation and hemostasis work up, normal serum erythropoietin, and normal MRI of the cerebrum.

The figures the patient took by herself and brought to the consultation were not entirely illustrative, but best covering. Based on the clinical picture, clinical examination, and neurological assessment, the patient was diagnosed with peripheral facial nerve palsy without underlying disease or evidence of thrombosis, which resolved completely. The patient´s symptoms were probably due to her COVID-19 vaccination with AZD1222. After 5 months, she was still troubled by severe hyperesthesia of the upper body; light touch of her arms was especially painful. She also struggled with inflammation of her right arm, possibly from tendinitis, which she previously had suffered from. She still has a tendency to bruise (similar to Figures 1 and 2) during exercise or after taking a hot shower, but this has decreased. There were no new episodes of suspected ischemic cerebrovascular events, except for weakness in her right arm, which she still experiences. The patient has not taken any new medications nor has she been exposed to anything other than the AZD1222 vaccine. Although it cannot be proven, it is likely that there is a connection between the patient´s Bell´s palsy and the AZD1222 vaccination. There have been similar reports from people who have been vaccinated with other COVID-19 vaccines previously.

OUTCOME AND FOLLOW-UP

The patient had completely recovered from the peripheral facial paralysis after 2-3 days, without undergoing treatment. After 5 month, she was still troubled by severe hyperaesthesia of the upper body, and she still has a tendency to bruise during exercise or after taking a hot shower, but this has decreased and is controlled by her GP.

DISCUSSION

The aim of this case report is to raise awareness of Bell´s palsy as a possible side effect of Astra Zeneca´s COVID-19 vaccine. The development of facial nerve palsy may be due to local pressure from the swelling of the face and neck, but we cannot rule out the possibility that the palsy is due to inflammatory and immunologic mechanisms triggered by the vaccine.

To our knowledge, this is the first case reported in Norway of peripheral facial paralysis following the Astra-Zeneca vaccine. Several cases of facial paralysis have been reported after COVID-19 vaccines in other countries.(1) In December 2020, a study reported four cases of peripheral facial nerve palsy in individuals who received Pfizer´s COVID-19 vaccine, while no one in the control group (placebo) had similar symptoms. In a study of Moderna´s COVID-19 vaccine, it was reported that three participants in the intervention group and one in the control group developed peripheral facial nerve palsy.(1) Subsequently, several cases of peripheral facial nerve palsy as a possible side effect of COVID-19 vaccines have been reported internationally.

In the United States, the Food and Drug Administration (FDA) reported that there is no definite link between the COVID-19 vaccine and Bell´s palsy.(1) In contrast, the National Health Service (NHS) in the United Kingdom confirmed that Bell´s palsy is one

of the side effects of the COVID- 19 vaccine. (2)

According to the FDA, the number of reports of facial paralysis following COVID-19 vaccination received to date is not significantly higher than the naturally expected incidence- they do not indicate increased risk following COVID-19 vaccination, but this may be due to under-reporting.(1) Bell´s palsy has previously been described as a complication of influenza vaccination.(3) In 2004, the inactivated intranasal influenza vaccine was shown to increase the risk of Bell´s palsy; after this finding, the vaccine was discontinued.(3)

Despite the risk of developing Bell´s palsy, the FDA and the NHS, as well as the WHO have approved Pfizer´s and Moderna´s COVID-19 vaccines because the potential benefits of these vaccines outweigh the risk of facial paralysis, which usually resolves spontaneously.(2,4)

LEARNING POINTS/TAKE HOME MESSAGES

Peripheral facial paralysis can occur following the COVID-19 vaccination.

The paresis usually goes in remission in a few days, and often spontaneously.

It has not been reported recurrence after new vaccinations.

ACKNOWLEDGEMENT

Conflict of Interest

No interest.

Support Resources

Non.

Ethical Declaration

Non.

Authorship Contributions

Concept: ET, Design: ET, Supervising: ET, AA, Financing and equipment: non, Data collection and entry: ET, AA, RA Interpretation: ET, AA, Literature search: ET, AA, RA, Writing: ET, AA, RA, Critical review: non.

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