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Effect of Chewing Gum and Stress Ball on Labor Pain, Duration of Labor, and Birth Satisfaction: A Randomized Controlled Study

Sakız Çiğneme ve Stres Topunun Doğum Ağrısı, Doğum Süresi ve Doğum Memnuniyeti Üzerine Etkisi: Randomize Kontrollü Çalışma

Şahika ŞİMŞEK ÇETİNKAYA, Ayşenur DURMUŞ

Kastamonu Üniversitesi Sağlık Bilimleri Fakültesi, Ebelik Bölümü, Kastamonu, Türkiye

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ABSTRACT

Objective: To investigate the effects of gum chewing (GG) and stress ball (BG) use on labor pain, labor duration, and birth satisfaction in women.

Methods: This study was conducted in a maternity clinic as a randomized controlled experimental study. Ninety-six women were randomly divided into three groups. The sample of the study consisted of 96 pregnant women, 32 in the GG group, 32 in the BG use group, and 32 in the control group (CG). When the mother's pain began in the latent phase and active phase; The group using the BG had the BG squeezed for 20 min, the GG group had gum chewed for 20 min, and the CG received only standard care. Women were evaluated before and after the intervention in terms of pain intensity and post-intervention satisfaction level. Personal information form, labor follow-up form, Visual Analog Scale, and birth satisfaction scale were used to collect data.

Results: After the interventions, labor pain was less in the GG and BG groups than in the CG. At the same time, birth satisfaction in the GG and BG groups was higher than the CG ($p<0.05$).

Conclusion: GG and using BG techniques are extremely effective in alleviating labor pain and satisfaction in primiparous women. There was no difference in labor pain reduction between the two interventions. These interventions have no effect on labor duration. These results show that GG and BG are effective nursing interventions for relieving labor pain and can be safely used.

Keywords: Chewing gum, labor pain, satisfaction, women, nursing, midwifery

ÖZ

Amaç: Kadınlarda sakız çiğnemenin (GG) ve stres topu (BG) kullanımının doğum ağrısı, doğum süresi ve doğum memnuniyeti üzerine etkilerini araştırmaktır.

Yöntem: Bu çalışma randomize kontrollü deneysel bir çalışma olarak doğum kliniğinde gerçekleştirildi. Doksan altı kadın rastgele üç gruba ayrıldı. Araştırmanın örneklemini 32'si GG grubunda, 32'si BG kullanma grubunda ve 32'si kontrol grubunda olmak üzere 96 hamile kadın oluşturdu. Latent faz ve aktif fazda annenin ağrısı başladığında; BG kullanan gruba 20 dakika boyunca BG sıktırıldı, GG grubuna 20 dakika sakız çiğnetildi, kontrol grubuna ise sadece standart bakım verildi. Kadınlar müdahale öncesi ve sonrası ağrı yoğunluğu ve müdahale sonrası memnuniyet düzeyi açısından değerlendirildi. Verilerin toplanmasında, kişisel bilgi formu, doğum eylemine ilişkin izlem formu, Visual Analog Skala ve doğum memnuniyet ölçeği kullanıldı.

Bulgular: GG ve BG gruplarında müdahaleler sonrasında doğum ağrısı kontrol grubuna göre daha azdı. Aynı zamanda GG ve BG gruplarının doğum memnuniyeti kontrol grubuna göre daha yüksekti ($p<0,05$).

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Corresponding Author/ Sorumlu Yazar:
Ayşenur DURMUŞ PhD,
Kastamonu Üniversitesi Sağlık Bilimleri Fakültesi, Ebelik Bölümü, Kastamonu, Türkiye
aysenurdurmus@kastamonu.edu.tr
ORCID: 0000-0003-0361-8036

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Sonuç: GG ve BG tekniklerini kullanmak, primipar kadınlarda doğum ağrısı ve tatmini üzerinde son derece etkilidir. İki müdahale arasında doğum ağrısının azaltılmasında hiçbir fark yoktu. Bu müdahalelerin doğum süresine hiçbir etkisi yoktur. Bu sonuçlar, GG'nin ve BG'nin doğum ağrısının giderilmesinde etkili hemşirelik ve ebelik müdahaleleri olduğunu ve güvenle kullanılabileceğini göstermektedir.

Anahtar Kelimeler: Sakız çiğneme, doğum ağrısı, memnuniyet, kadın, hemşirelik, ebelik

INTRODUCTION

Birth is one of life's most special experiences, in which the mother and family members meet the baby.[1] Experiences during childbirth affect the mother's physical and emotional health, desire to have a child again, and emotional relationship with the child.[2] Labor pain is one of the most painful experiences for women in their lifetime. Pain is an inevitable fact of childbirth and is the most important determinant of the birth experience.[3] Birth pain is not a sign of tissue damage; it is continuous and eventually leads to a sweet and pleasant event where the mother and baby meet.[4] Besides being a physiological pain, labor pain is one of the most important reasons for fear of childbirth. Approximately 75% of primiparous women report that labor pain is unbearable.[5] Studies show that mothers with higher labor pain levels have lower birth satisfaction and prefer cesarean delivery more.[6] The level of labor pain significantly affects the psychology of the mother, fetal well-being, and progression of labor. When labor pain is not managed effectively, it causes emotional distress and fatigue in the mother, reduces birth satisfaction, and may cause an increase in birth complications.[7] For this reason, the American Society of Anesthesiology and the American Society of Obstetrics and Gynecology recommended various approaches and treatments to relieve labor pain.[8] The fundamental purpose of maternity care is to manage and control labor pain, which is an important part of midwifery/nursing services. Midwives/nurses have important duties to manage the labor pain experienced by the mother during labor. There are many studies in the literature examining the effects of non-pharmacological methods on labor pain. Training programs, massage, reflexology, relaxation, hot and cold application, birth ball use, water injection into the inner or subcutaneous tissue, water therapy, sugar-free gum chewing, acupressure, aromatherapy, and music therapy are some of these methods.[9,10] Non-pharmacological treatments are safe, give the woman autonomy in her own body, do not change the course of labor, and do not have negative side effects. In addition, these strategies increase women's labor satisfaction and can be used independently by nurses and midwives.[11] Although there are many non-pharmacological methods used to reduce labor pain, chewing gum (GG) and stress balls (BG) can be used as a method of distraction due to their cost-effectiveness, accessibility, ease of application, and no side effects. There are limited studies in the literature showing the effect of GG on labor pain.[10] In the study, birth satisfaction and birth duration were examined by making one group chew gum and the other group watch VR videos.[10] In this study, we evaluated labor pain, duration, and satisfaction. However, to the best of our knowledge, there is no study comparing chewing and BG use on labor pain. Nurses and midwives will be aware of the effectiveness of non-pharmacological approaches in controlling labor pain and length of labor because of this study. In this study, we determined the effects of chewing and BG use on labor pain, duration of labor, and birth satisfaction.

The study addressed the following hypotheses:

1. Women in the GG and BG groups had lower pain levels than women in the control group (CG).

2. The duration of birth will be shorter for women in the GG and SB than for those in the CG.

3. Women in the GG and SB will be more satisfied with their birth experience than those in the CG.

METHODS

Study design A randomized controlled trial was conducted to evaluate the effectiveness of GG and using a BG on labor pain perception, labor duration, and labor satisfaction. Women were recruited from the obstetrics department of a Training and Research Hospital between 15.11.2021 and 15.03.2022. The report of this clinical trial is based on the CONSORT checklist (Figure 1).

Ethical Considerations

This study was approved by the Kastamonu University Clinical Research Ethics Committee (decision no: 2020/KAEK-143-132, date: 05.11.2021). This study was conducted according to the principles of the Declaration of Helsinki. The authors explained the study to all the women. Before each participant participated in the study, verbal and written informed consent was obtained for anonymity.

This study is registered with NCT05380258 in the ClinicalTrials.gov Protocol Registry and Results system.

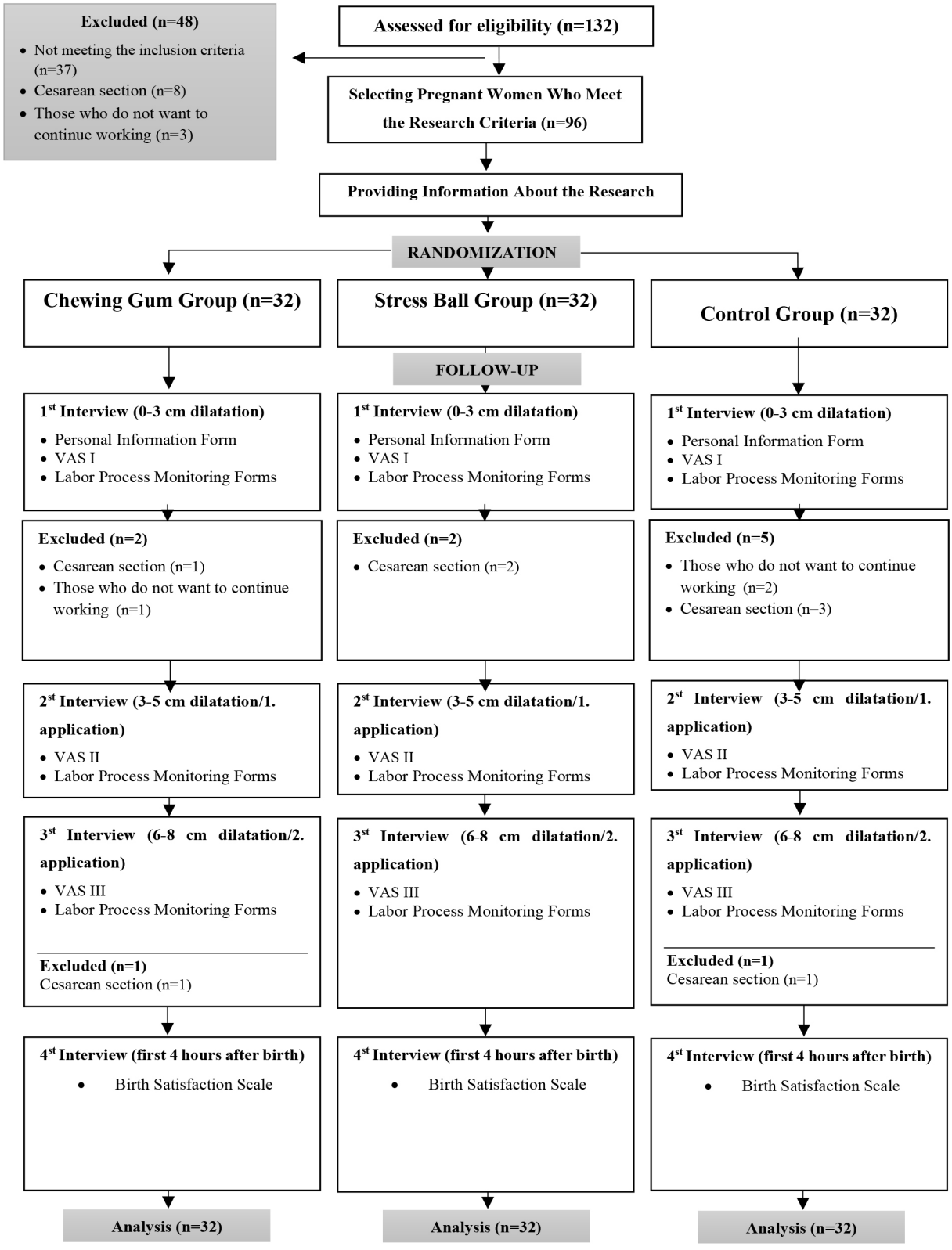

Figure 1. CONSORT flow diagram

VAS: Visual Analog Scale

Participants

The inclusion criteria were as follows: being primiparous, having a full-term delivery, being able to have spontaneous vaginal delivery, being able to communicate verbally, being between the ages of 18 and 35 years, not having a risky pregnancy, having a single fetus in the vertex position, having the contractions started and continuing regularly, being in the latent phase of the labor (0-4 cm dilatation), not using any analgesia or using any pain medication to reduce pain during labor, and volunteering to participate in the study. Exclusion criteria were making a cesarean section decision, having a high-risk pregnancy, having multiple pregnancies, and being multiparous.

Sample Size

In the study of Ebrahimian and Rahmani Bilandi[10] (2021), the minimum clinically significant difference for the second stage length (min) effect size (d) was 0.768. The analysis was based on a power of 80% and an α of 0.05. The minimum sample size was 28 participants in each group. The sample size for each study group was 32, with a 20% dropout rate. In our study, substitute subjects with the same characteristics were included instead of patients who dropped out.

Randomization

The participants, after being evaluated in consultation by a doctor for normal delivery and after declaring that they were willing to participate in the study, were randomly assigned to the waiting list for the intervention groups (GG Group-GG) (BG Group-BG) or to the standard care group (Control Group-CG). Allocation was performed by an independent nurse who was not involved in the study at any stage. The Research Randomizer software (http://www.randomizer.org.) was used to generate a randomized list by applying a simple randomization technique to each participant's allocation. In reporting the research, an application flow chart was created using the CONSORT diagram recommended for randomized controlled studies.

Interventions

Chewing Gum Group

Interventions occurred in the delivery room of the hospital. After the pregnant women were admitted to the delivery room, a personal information form, a follow-up form for labor, and Visual Analog Scale I (VAS I) were administered to the pregnant women with 0-3 cm cervical dilatation. In this group, pregnant women with cervical dilatation of 4-5 cm started GG as soon as their contractions came, and they chewed gum for 20 min. In our study, sugar-free gum was used. At the end of the 20 min, the pain levels of the pregnant women between contractions were measured with VAS II, and the necessary information regarding labor was recorded in the follow-up form. Pregnant women with cervical dilatation in the range of 6-8 cm in the active phase started GG as soon as the contraction occurred and chewed gum for 20 min. At the end of 20 min, the pain levels of the pregnant women between contractions were measured with VAS III, and the necessary information regarding labor was recorded in the follow-up form. The birth satisfaction of the mothers was determined by applying the Birth Satisfaction Scale to the mothers in the postpartum service within the first 4 h after delivery.

Stress Ball Group

The BG, which is the intervention material to be used in the research, is a 6 cm-diameter ball with a soft texture and different sportive patterns. Interventions occurred in the delivery room of the hospital. After the pregnant women were admitted to the delivery room, a personal information form, a follow-up form for labor, and VAS were administered to the pregnant women with 0-3 cm cervical dilatation. In this group, pregnant women with cervical dilatation of 4-5 cm were given a BG as soon as their contractions began, and they were asked to squeeze the ball for 5 s and relax for 2 s for 20 min. At the end of 20 min, the pain levels of the pregnant women between contractions were measured with VAS II, and the necessary information regarding labor was recorded in the follow-up form. Pregnant women with cervical dilatation in the range of 6-8 cm in the active phase were given a BG as soon as the contraction started, and they were asked to squeeze the ball for 5 s and relax it for 2 s. At the end of 20 min, the pain levels of pregnant women between contractions were measured with VAS III, and the necessary information regarding labor was recorded in the follow-up form. The birth satisfaction of the mothers was determined by applying the Birth Satisfaction Scale to the mothers in the postpartum service within the first 4 h after delivery.

Control Group

Participants in this group received standard care (follow-up contractions, cervical dilatation vital signs, and fetal heart monitoring). During labor, women's spouses or relatives are prohibited from being present in delivery rooms. Therefore, women do not receive support from anyone during active labor other than maternity nurses or midwives. The personal information form, follow-up form for labor, and VAS I were applied to pregnant women with 0-3 cm cervical dilatation. When the cervical dilatation of the pregnant women who received routine care was 4-5 cm, their pain levels were measured using VAS II, and the necessary information was recorded in the labor follow-up

form. Pregnant women with cervical dilatation in the range of 6-8 cm in the active phase, the pain levels of pregnant women between contractions were measured with VAS III, and the necessary information regarding labor was recorded in the follow-up form. The birth satisfaction of the mothers was determined by applying the Birth Satisfaction Scale to the mothers in the postpartum service within the first 4 h after delivery.

Measures

Personal Information Form

A personal information form was developed to collect data on the participants' characteristics. Five questions about sociodemographic factors were included in the questionnaire (age, educational status, family type, working status, income level).

Visual Analog Scale

The VAS is a commonly used scale to assess pain severity based on self-report. VAS is a 10 cm line drawn horizontally or vertically. On a 10 cm ruler scale, 0 indicates no pain and 10 shows the most severe pain. The patients are asked to mark this line based on the severity of their pain. A ruler is used to measure the distance between the lowest point on the VAS and the patient's mark [Gokyildiz Surucu et al.[12] (2018)].

Labor Process Monitoring Forms

Some sections include the time of onset of labor, cervical dilatation and effacement findings, vital signs of the pregnant woman, the time when applications to relieve labor pain begin, VAS scores, and the duration of the latent and active phases of labor. This form was used to evaluate whether the interventions made in the study affected the duration of labor, the health status of the mother and the fetus, and the pain score according to phases.

Birth Satisfaction Scale

The BSS entails 30 Likert questions. It was developed by Hollins Martin and Fleming. It was adapted into Turkish by Cetin et al.[13] (2015). Scores on the scale varied from 30 to 150 points. High scores indicate high birth satisfaction. The scale identified three overarching themes: service provision (home assessment, birth environment, support, and relationships with health care professionals); personal attributes (ability to cope during labor, feeling in control, childbirth preparation, and relationship with baby); and stress experienced during labor (distress, obstetric injuries, receiving adequate care, obstetric intervention, pain, and baby's health). Cronbach's alpha coefficient was 0.62.

Statistical Analysis

The data were analyzed using IBM e Statistical Package for the Social Sciences 23.0 statistical software (IBM Corp., Armonk, New York). Descriptive statistics include the number of units (n) and percentage (%); for numerical variables with normal distribution, mean±standard deviation was used. The normal distribution of the data of the numerical variables was evaluated using the Shapiro-Wilk normality test. The Shapiro-Wilk test was used to determine normality. Because the data were not normally distributed, non-parametric tests were used. The Kruskal-Wallis test was used to compare numerical variables in more than two independent groups. Pre-test and post-test differences within the groups were examined using the Wilcoxon test. Because of the "Kruskal-Wallis test", the "Mann-Whitney U test" was applied to determine the source of the difference. The chi-square test was used to compare baseline variables, which included categorical data such as educational level, working status, family type, and income levels. One-way ANOVA was used to compare the ages. The Mann-Whitney U test was used to compare the study groups in terms of VAS score, duration of labor, and birth satisfaction score. To define group differences, Tukey's HSD post-hoc test was used. The statistical significance level for all tests was considered $p<0.05$.

RESULTS

Demographic Characteristics

The mean ages of the participants were GG (27.09±5.85), BG (26.53±6.35), and CG (25.06±3.19) years in the groups, respectively. 37.5% of the women in the GG, 46.9% of the women in the CG graduated from high school, and 43.7% of the women in the BG had completed high school. 31.3% of the participants in the GG, BG (43.7%), and CG (53.1%) were unemployed. The majority of women (GG 87.5%; BG: 84.4%, CG 71.9%) have a nuclear family structure. More than half of the participants in all the groups had a moderate income level. There was no significant difference among the three groups in sociodemographic terms (Table 1; $p>0.05$).

Effects of Chewing Gum and Stress Balls on Pain

The mean VAS scores were GG (3.18±0.85), BG (3.13±0.51) and GG (3.36±0.83) in the groups, respectively, at baseline, and there was no statistically significant difference ($p>0.05$) in VAS scores between the groups at baseline. When the cervical dilatation was 4-5 cm before the application, the pain level of the women increased to 9.46±0.75 in GG, 9.06±0.98 in BG, and 8.91±1.30 in CG± and there was no significant difference between the groups in VAS scores ($p>0.05$). After application while cervical dilatation was 6-8

cm VAS scores of women were 7.52±1.25 in GG, 6.88±1.45 in BG, 9.94±0.25 in CG. There was no significant difference between the intervention groups in terms of labor pain scores (p>0.05). VAS scores in the GG and BG groups were lower than those in the CG (Table 2; p<0.05).

Effect of Chewing Gum and Stress Ball Duration During Labor

The mean duration of the latent phase in women was 8.38±1.50 hours in GG, 8.47±1.76 hours in BG, and 8.56±1.65 in CG. In women, there was no statistical difference between the groups in terms of the latent phase (Table 3; p>0.05). When the groups are compared in accordance with the duration of the active phase, there is no significant difference between the groups in time and it was 6.34±1.48 hours in GG, 5.81±1.53 hours in BG and 5.94±1.44 hours in CG. When the groups were compared in terms of total delivery time, the delivery lasted 15.50±3.37 hours, in the GG group 16.22±2.71 hours in BG, and 15.47±3.09 hours in CG. In addition, there was no significant difference between the groups regarding delivery time (Table 3; p>0.05).

Effect of Chewing Gum and Stress Balls on Birth Satisfaction

During the study period when the birth satisfaction of the women was evaluated, there was a significant difference between the birth satisfaction of the intervention and CG (p<0.05; Table 3), and the mean satisfaction scores were 82.41±12.02 in CG, 96.44±12.02 in GG and 91.88±8.65 in BG, respectively.

Table 1. Sociodemographic and clinical characteristics of participants

	GG (n=32)		BG (n=32)		CG (n=32)		p
Age (X±SD)	27.09±5.85		26.53±6.35		25.06±3.19		0.110[a]
	n	%	n	%	n	%	
Educational level							
Illiterate	3	9.4	2	6.2	3	9.4	0.300[b]
Primary school	7	21.8	10	31.3	9	28.1	
High school	12	37.5	14	43.7	15	46.9	
University	10	31.3	6	18.8	5	15.6	
Employment status							
Working	22	68.7	18	56.25	15	46.9	0.256[b]
Not working	10	31.3	14	43.75	17	53.1	
Family type							
Nuclear family	28	87.5	27	84.4	23	71.9	0.249[b]
Extended family	4	12.5	5	15.6	9	28.1	
Income level							
Income more than expense	4	12.5	1	3.1	3	9.4	0.559[b]
Income equals expense	20	62.5	25	78.1	21	65.6	
Income less than expense	8	25.0	6	18.8	8	25.0	

GG: Gum group, BG: Ball group, CG: Control group, X±SD: Mean±standard deviation, [a]One-way ANOVA, [b]Chi-square test

Table 2. Breakdown of the visual analog scores means of the patients in the groups at baseline, before and after application

VAS score	GG X±SD (min-max)	BG X±SD (min-max)	CG X±SD (min-max)	Intergroup p	Pair analyses
Baseline (0-3 cm dilatation)	3.18±0.85 2-5	3.13±0.51 1-4	3.36±0.83 2-5	0.043	-
After application (4-5 cm dilatation)	9.46±0.75 8-10	9.06±0.98 7-10	8.91±1.30 6-10	0.094	-
After application (6-8 cm dilatation)	7.52±1.25 5-10	6.88±1.45 3-10	9.94±0.25 9-10	**0.000*** **	1-3. 2-3*
Intragroup p	**0.000****	**0.000****	-	-	-

*Mann-Whitney U test.
**Wilcoxon signed-rank test.
***Kruskal-Wallis.
GG: Gum group, BG: Ball group, CG: Control group, min-max: Minimum-maximum, SD: Standard deviation, VAS: Visual Analog Scale

Table 3. Comparison of the groups in terms of durations of delivery and birth satisfaction				
Duration of birth	**GG**	**BG**	**CG**	**Test value p***
	Mean±SD	**Mean±SD**	**Mean±SD**	
Latent phase time (hours)	8.38±1.50	8.47±1.76	8.56±1.65	0.901
Active phase time (hours)	6.34±1.48	5.81±1.53	5.94±1.44	0.329
Total duration of delivery	15.50±3.37	16.22±2.71	15.47±3.09	0.544
Birth satisfaction scale	96.44±12.02	91.88±8.65	82.41±12.02	**0.000**
*Kruskal-Wallis. GG: Gum group, BG: Ball group, CG: Control group, SD: Standard deviation				

DISCUSSION

During labor, pain and stress are common concerns, especially among primigravida. It may prolong labor, raise stress hormones, and have an impact on maternal and newborn outcomes.[14] Pain management and the stress of labor and delivery are two of the most pressing problems in the healthcare system. The use of distraction techniques during childbirth minimizes labor pain and stress.[15] In our study, the pain level of women in the latent phase was low, and there was no significant difference between the groups in terms of labor pain ($p>0.05$). In the active phase, when the pain intensity of women increased, both GG and BG use significantly reduced the pain severity of women compared with the CG ($p<0.05$). Various pharmacological and non-pharmacological techniques for managing and decreasing pain have been proposed.[16]

GG is a low-cost, well-tolerated, safe, and effective method of reducing anxiety and stress.[17] GG reduces women's focus and thinking about pain related to childbirth as they concentrate on chewing. The central nervous system and pain-free nerve transmitters are less affected by the distraction strategy.[18] In a limited number of studies on labor pain, GG has been reported to reduce labor pain.[19] The results of this study are consistent with those of previous studies on the impact of GG on pain intensity. The usage of a BG has been described as a distraction tool in the therapy of various symptoms in minimally invasive procedures or its influence on acute stress levels in the literature. However, no study has investigated the effect of BG on labor pain. It has been reported that the clinical use of the method of directing thoughts is beneficial and helps women relax in managing labor pain.[20] While squeezing out the BG reduced labor pain by 2.18 points, GG reduced the VAS score by 1.94 points in this study. Although this difference is not statistically significant, this may be because pregnant women using the BG stretch and release large muscle groups and also focus on deep breathing. The findings showed that GG and BG use reduced labor pain but did not affect labor duration ($p>0.05$). There is no similar study on this subject; therefore, this information is of particular importance in terms of contributing to the literature. In the literature, it has been researched according to the duration of different distraction techniques. In the literature, as well as studies showing that distraction does not influence the duration of birth[15] similar to our study, studies are also showing that distraction techniques shorten. the duration of birth.[10,21] It is thought that the interventions in our study did not affect the duration of delivery because labor is dependent on many factors. Satisfaction with birth is an important indicator in evaluating birth experience. Determination of birth satisfaction is important as it is an indicator of maternal care quality, as well as showing the well-being of the newborn and mother.[22,23] In our study, the birth satisfaction of the women in the intervention group was found to be higher than that in the CG ($p<0.05$). Ebrahimian et al.[19] (2022) also found that women's satisfaction in the GG group was statistically higher than that in the virtual reality and CG. In our study, it is thought that women's satisfaction is increased by being able to control the birth individually and getting support from someone they trust during birth.[10]

Study Limitations

Our study was the first to use gum chewing and BG interventions to evaluate labor pain. However, this study has some limitations. First, blinding could not be performed because of the design of our study. Second, because the experience of pain was an individual experience, the measurements were based on women's self-reports.

CONCLUSION

The primary findings of this study are that in the latent and active phases of labor, GG and BG application increase birth satisfaction and reduce the perceived severity of labor pain. It has been determined that BG and GG applications do not pose any risk to maternal and fetal health and can be safely applied as routine care during labor. Thus, it is concluded that BG and GG applications are effective midwife/nursing interventions during labor.

Acknowledgment

We thank all the participants who contributed to this study.

Ethics

Ethics Committee Approval: This study was approved by the Kastamonu University Clinical Research Ethics Committee (decision no: 2020/KAEK-143-132, date: 05.11.2021).

Informed Consent: Before each participant participated in the study, verbal and written informed consent was obtained for anonymity.

Authorship Contributions

Surgical and Medical Practices: Ş.Ş.Ç., A.D., Concept: Ş.Ş.Ç., A.D., Design: Ş.Ş.Ç., A.D., Data Collection or Processing: Ş.Ş.Ç., A.D., Analysis or Interpretation: Ş.Ş.Ç., Literature Search: Ş.Ş.Ç., A.D., Writing: Ş.Ş.Ç., A.D.

Conflict of Interest: No conflict of interest was declared by the authors.

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