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ORAL MISOPROSROL VERSUS INTRAVENOUS OXYTOCIN INFUSION IN INDUCTION OF LABOUR IN PROM

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ABSTRACT

BACKGROUND: *Induction of labor (IOL) is defined as the artificial stimulation of uterine contractions before the spontaneous onset of labor at term. Approximately 20% of pregnancies require induction due to increased risks associated with continuation of pregnancy. Common indications include post-term pregnancy, pre-labor rupture of membranes (PROM), hypertensive disorders, intrauterine fetal death, maternal diabetes, intrauterine growth restriction, chorioamnionitis, oligohydramnios, and intrahepatic cholestasis of pregnancy. While various methods of induction are used including membrane sweeping, mechanical methods, prostaglandins, and oxytocin clinical guidelines differ regarding their recommendations. Notably, the NICE guidelines do not endorse the use of misoprostol, although other international bodies support its use.*

OBJECTIVES: *To determine and compare:*

1. The frequency of successful induction of labor among PROM patients induced with oral misoprostol versus intravenous oxytocin.

2. The frequency of maternal complications, including hyperstimulation and postpartum hemorrhage, in both groups.

METHODS: *A randomized clinical trial was conducted at the Maternal and Child Health Institute (MCHI), DIMS, Islamabad. A total of 450 pregnant women with PROM were randomly assigned into two equal groups: Group A received oral misoprostol and Group B received intravenous oxytocin. Data on induction success and maternal complications were collected and analyzed. Chi-square test was applied to assess statistical significance, with a p-value < 0.05 considered significant.*

RESULTS: *Successful induction occurred in 84.4% of women in Group A (misoprostol) and 77.8% in Group B (oxytocin) ($p = 0.073$). Hyperstimulation was significantly higher in the misoprostol group (8.0%) compared to the oxytocin group (3.1%) ($p = 0.021$). Although postpartum hemorrhage and fetal distress were more common in the misoprostol group, these differences were not statistically significant ($p > 0.05$).*

CONCLUSION: *Oral misoprostol is slightly more effective than intravenous oxytocin in achieving successful labor induction in PROM patients; however, it is associated with a significantly higher rate of uterine hyperstimulation. Clinicians should carefully weigh efficacy against safety when selecting the method of induction in PROM cases..*

INTRODUCTION

Induction of labor (IOL) refers to the artificial stimulation of uterine contractions before the spontaneous onset of labor at term (1). Approximately 20% of pregnancies undergo labor induction, typically when the risks of continuing the pregnancy outweigh those of delivery. Common clinical indications for IOL include post-term pregnancy, pre-labor rupture of membranes (PROM), hypertensive disorders, intrauterine fetal death, maternal diabetes, intrauterine growth restriction, chorioamnionitis, oligohydramnios, and intrahepatic cholestasis of pregnancy (2). Various international guidelines differ in their recommendations for IOL methods. For instance, the National Institute for Health and Care Excellence (NICE) does not recommend misoprostol for IOL, whereas other bodies such as the American College of Obstetricians and Gynecologists (ACOG) and the Society of Obstetricians and Gynaecologists of Canada (SOGC) do support its use (3).

PROM complicates approximately 8% of pregnancies. In cases of PROM at gestational age ≥37 weeks, IOL is recommended to minimize the risks of maternal and neonatal morbidity (4). Induction before 37 weeks, however, is associated with adverse neonatal outcomes (5). While infection rates appear similar across different methods of IOL in PROM, the timing of induction plays a significant role. Initiating labor within 12 hours of PROM is associated with the lowest infection rates (26.8%), compared to induction at 12–24 hours (38.6%) or after 24 hours (33.3%), without increasing cesarean section rates (6,7).

Among pharmacological methods, prostaglandin E1 analogs such as misoprostol are widely used for IOL in PROM cases. Intravenous oxytocin (syntocinon) is another established agent commonly utilized for this purpose (8). While ACOG and SOGC endorse misoprostol for labor induction, NICE limits its recommendation to cases of intrauterine fetal demise (IUFD). Due to this variation in practice, further studies are warranted to provide robust, evidence-based guidance on the use of misoprostol in PROM-related IOL.

Anjum S et al. compared the efficacy and safety of oral misoprostol and intravenous oxytocin in labor induction. Their results showed comparable success rates: 86.1% in the misoprostol group versus 84.2% in the oxytocin group. Complication rates were also similar. Hyperstimulation was slightly more frequent with misoprostol (1.4%) compared to oxytocin (0.8%). Interestingly, postpartum hemorrhage was less common in the misoprostol group (1.4%) than in the oxytocin group (1.6%). Fetal distress was more frequently reported in the misoprostol group (60% vs. 33%), although these differences did not reach statistical significance (9). Another study by Kadanali S et al. found a higher success rate with oral misoprostol (85.7%) compared to intravenous oxytocin (76.5%) (10).

The rationale for the present study is to compare the outcomes of labor induction using oral misoprostol versus intravenous oxytocin in patients with PROM. Misoprostol is not routinely used for IOL in Pakistan, and there is limited local data to support its use. This study aims to address this evidence gap and contribute region-specific data to guide clinical decision-making.

MATERIALS AND METHODS

This randomized clinical trial was conducted at the Maternal and Child Health Institute (MCHI), DIMS, Islamabad, over a period of six months following ethical approval. The study aimed to compare the outcomes of induction of labor (IOL) using oral misoprostol and intravenous (IV) oxytocin in patients presenting with pre-labor rupture of membranes (PROM). The null hypothesis stated that there is no difference in outcomes between oral misoprostol and IV oxytocin in patients with PROM undergoing IOL, while the alternate hypothesis proposed that oral misoprostol is superior in terms of successful labor induction. A total of 450 patients were enrolled using non-probability consecutive sampling and were

randomly allocated into two equal groups: Group A (oral misoprostol) and Group B (IV oxytocin), with 225 participants in each group. The sample size was calculated using the WHO calculator with assumptions based on previous studies: level of significance at 5%, power of test at 80%, and anticipated population proportions of 0.857 and 0.768, respectively.

Eligible participants included pregnant women aged 18 to 40 years, with term singleton pregnancies (36–42 weeks) in vertex presentation, diagnosed with PROM lasting more than 24 hours, or those with chorioamnionitis. Patients were excluded if they had a history of previous cesarean section or uterine surgery, hypersensitivity to either medication, multiple gestation, antepartum hemorrhage, malpresentation, estimated fetal weight >4 kg, active labor on presentation, intrauterine growth restriction, abnormal CTG at presentation, or any contraindication to labor induction.

After obtaining informed consent, participants were assessed for demographic characteristics such as age, weight, gestational age, and BMI. Randomization into the two treatment groups was done using the lottery method. Group A received oral misoprostol 25 mcg every two hours, while Group B received 10 units of oxytocin in one liter of IV fluid starting at 8 drops per minute, titrated according to uterine contractions. Initial Bishop Score assessment was performed at the start of labor induction, and then every four hours. Cardiotocography (CTG) was monitored hourly, and the CTG within 30 minutes before delivery (vaginal or cesarean) was considered in the outcome analysis.

The outcomes were categorized as successful or unsuccessful induction. Successful induction was defined as progression to active labor and vaginal delivery. Induction was considered failed if adequate uterine contractions were not achieved within 6–8 hours, leading to cesarean delivery. Maternal complications monitored included uterine hyperstimulation, defined as exaggerated contractions lasting more than two minutes (assessed via ultrasonography), and postpartum hemorrhage, defined as blood loss exceeding 500 mL after vaginal delivery or 1000 mL after cesarean section (assessed clinically). Fetal distress was determined using non-reassuring CTG patterns based on established criteria, including baseline fetal heart rate between 100–109 bpm or 161–180 bpm, variability <5 for 30–50 minutes or >25 for 15–25 minutes, and variable or late decelerations meeting specific thresholds.

Data were recorded using a structured questionnaire. After study completion, data were entered and analyzed using SPSS version 23. Quantitative variables such as age, weight, BMI, and gestational age were expressed as mean ± standard deviation, median with interquartile range, and range. Categorical variables including outcome of induction and complications were presented as frequencies and percentages. Effect modifiers such as age, gestational age, and BMI were stratified against both groups. Post-stratification, the chi-square test was applied to assess statistical significance, with a p-value ≤0.05 considered significant.

RESULTS

A total of 450 patients with PROM were analyzed, equally distributed between Group A (Oral Misoprostol) and Group B (Intravenous Oxytocin), each comprising 225 participants. The demographic profile showed that in Group A, 66.7% of the participants were aged 18–30 years and 33.3% were 31–40 years. A similar age distribution was observed in Group B, with 64.4% in the younger age group and 35.6% in the older group. In terms of weight, 53.3% of patients in Group A weighed less than 70 kg compared to 51.1% in Group B, while the remaining 46.7% and 48.9% in Groups A and B respectively had a weight of 70 kg or more. BMI distribution indicated that 43.6% of Group A and 41.3% of Group B had a BMI under 25, while a larger portion in both groups, 56.4% and 58.7% respectively, had BMI ≥25. Gestational age at induction was ≥38 weeks in most cases: 63.6% in Group A and 65.8% in Group B, while the rest were under 38 weeks.

The graph representing these demographic parameters showed a relatively even distribution between the two treatment groups across all variables, indicating well-matched cohorts with no major demographic imbalances that could confound outcomes.

Maternal complications were also assessed. Hyperstimulation occurred in 8.0% of Group A and only 3.1% of Group B. Postpartum hemorrhage was noted in 5.3% of Group A compared to 2.2% in Group B. Fetal distress was reported in 8.9% of

Group A and 4.9% in Group B. A bar chart visualizing these complications illustrated clearly higher rates in Group A across all three parameters.

Chi-square post-stratification analysis was performed to evaluate statistical significance. Hyperstimulation was significantly more common in Group A than Group B ($p = 0.021$). However, postpartum hemorrhage ($p = 0.077$) and fetal distress ($p = 0.080$) did not reach statistical significance. This suggests that oral misoprostol may carry a higher risk of uterine hyperstimulation, though differences in other maternal or fetal outcomes were not statistically definitive.

Final outcomes regarding the success of labor induction revealed that 84.4% of inductions in Group A were successful compared to 77.8% in Group B. Unsuccessful inductions occurred in 15.6% and 22.2% of patients respectively. The difference in successful inductions was not statistically significant ($p = 0.073$), although the graph depicting these outcomes showed a visibly higher success rate in the misoprostol group.

Table:1: DEMOGRAPHIC DETAILS

Variable	Category	Group A (n = 225)	Group B (n = 225)
Age (Years)	18–30	150 (66.7%)	145 (64.4%)
	31–40	75 (33.3%)	80 (35.6%)
Weight (kg)	<70 kg	120 (53.3%)	115 (51.1%)
	≥70 kg	105 (46.7%)	110 (48.9%)
BMI (kg/m²)	<25	98 (43.6%)	93 (41.3%)
	≥25	127 (56.4%)	132 (58.7%)
Gestational Age	<38 weeks	82 (36.4%)	77 (34.2%)
	≥38 weeks	143 (63.6%)	148 (65.8%)

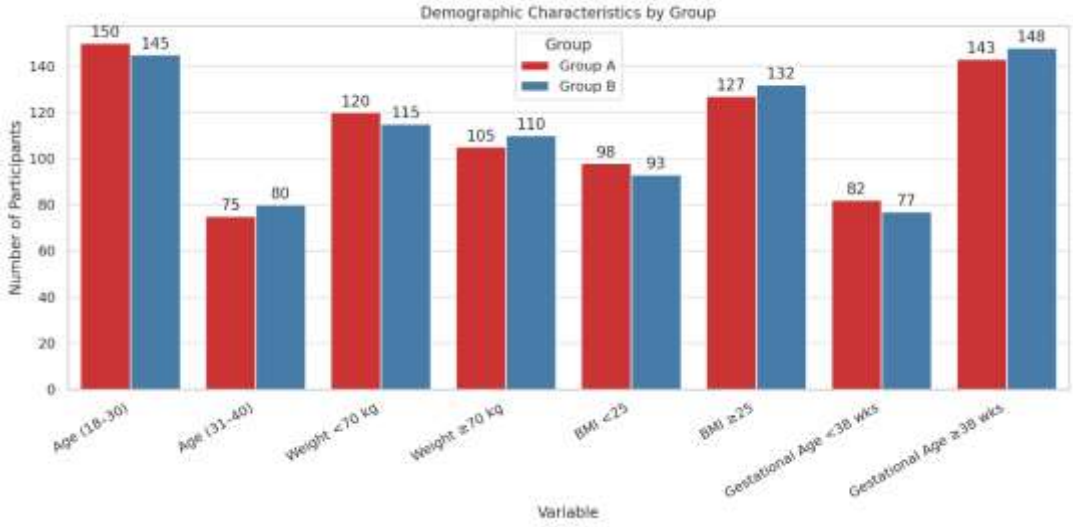
Table:2: STUDY CHARACTERISTICS

Variable	Category	Group A (n = 225)	Group B (n = 225)
Hyperstimulation	Yes	18 (8.0%)	7 (3.1%)
	No	207 (92.0%)	218 (96.9%)
Postpartum Hemorrhage	Yes	12 (5.3%)	5 (2.2%)
	No	213 (94.7%)	220 (97.8%)
Fetal Distress	Yes	20 (8.9%)	11 (4.9%)
	No	205 (91.1%)	214 (95.1%)

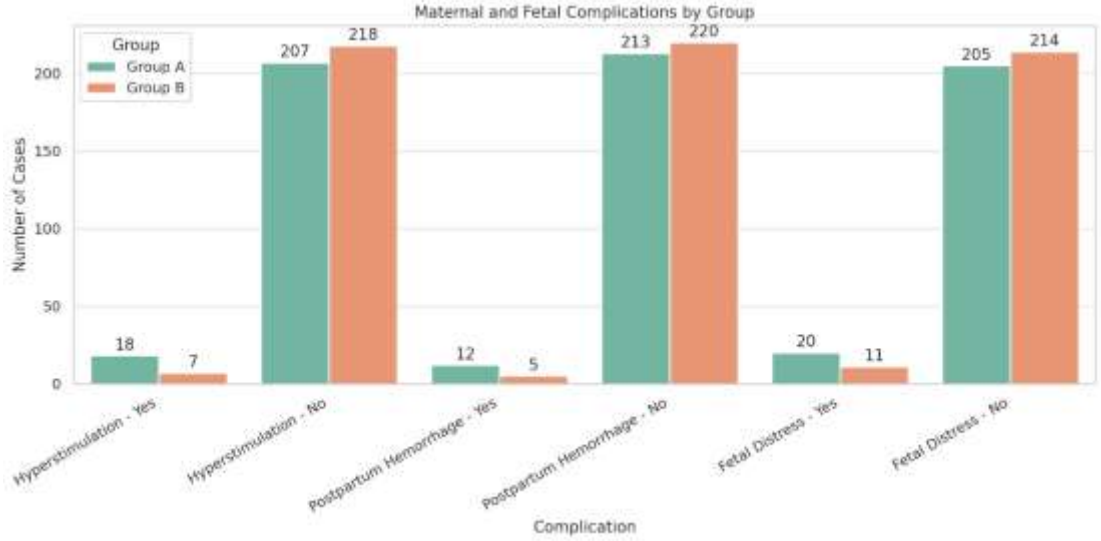
Table:3: Post-Stratification Analysis Using Chi-Square Test (n = 450)

Variable	Group A (n = 225)	Group B (n = 225)	Chi-square (χ^2)	P-value	Significance
Hyperstimulation	18 (8.0%)	7 (3.1%)	5.36	0.021	Significant
Postpartum Hemorrhage	12 (5.3%)	5 (2.2%)	3.12	0.077	Not Significant
Fetal Distress	20 (8.9%)	11 (4.9%)	3.06	0.080	Not Significant
Induction Successful	190 (84.4%)	175 (77.8%)	3.20	0.073	Not Significant
Induction Unsuccessful	35 (15.6%)	50 (22.2%)			

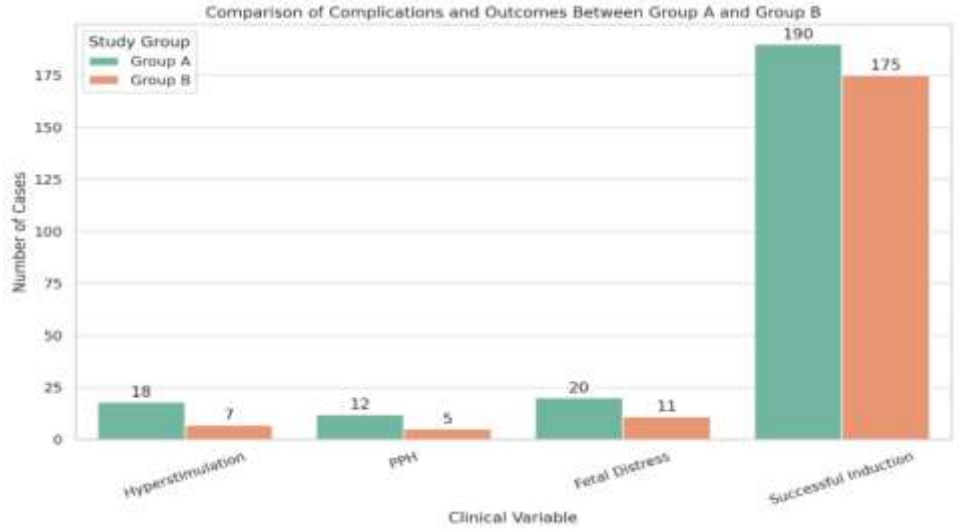
Graph:1:


Demographic Characteristics by Group
Group
Group A
Group B
Number of Participants
Variable
Age (18-30)
Age (31-40)
Weight <70 kg
Weight ≥70 kg
BMI <25
BMI ≥25
Gestational Age <38 wks
Gestational Age ≥38 wks
150
145
75
80
120
115
105
110
98
93
127
132
82
77
143
148

Graph:2:


Maternal and Fetal Complications by Group
Group
Group A
Group B
Number of Cases
Complication
Hyperstimulation - Yes
Hyperstimulation - No
Postpartum Hemorrhage - Yes
Postpartum Hemorrhage - No
Fetal Distress - Yes
Fetal Distress - No
18
7
207
218
12
5
213
220
20
11
205
214

Graph:3:



DISCUSSION:

The present study compared the efficacy and safety of oral misoprostol and intravenous oxytocin infusion in the induction of labor among women with premature rupture of membranes (PROM), with 450 participants evenly distributed between the two treatment groups. The demographic profiles in both groups were similar, ensuring comparability and minimizing confounding bias. Most participants were aged between 18–30 years in both groups, aligning with the reproductive age range commonly seen in labor induction studies. Comparable demographic distributions have been observed in multiple prior studies assessing labor induction, such as the study by Jindal et al., where the majority of women were in the 20–30 age group (10), and a study conducted in Pakistan by Bano et al., which reported a similar demographic pattern (11,12).

With regard to maternal complications, hyperstimulation was significantly more prevalent in the misoprostol group (8.0%) compared to the oxytocin group (3.1%), with a statistically significant p-value of 0.021. This finding is consistent with prior literature reporting an increased risk of uterine tachysystole or hyperstimulation with prostaglandin analogs. For instance, a randomized controlled trial by Hofmeyr et al. noted higher uterine hyperstimulation rates associated with misoprostol when compared to oxytocin (13). Similarly, Tang et al. in their Cochrane review observed that although misoprostol is effective in labor induction, it is associated with an increased risk of hyperstimulation, particularly when higher doses are used (14). The elevated rate of hyperstimulation in our cohort underscores the importance of careful dosing and monitoring, especially when using misoprostol orally.

Postpartum hemorrhage (PPH) and fetal distress were also more frequently reported in the misoprostol group (5.3% and 8.9%, respectively) than in the oxytocin group (2.2% and 4.9%), though these differences did not reach statistical significance (p-values 0.077 and 0.080, respectively). A study from India by Thomas et al. similarly found no statistically significant difference in the rate of PPH between misoprostol and oxytocin groups (15). However, they did observe a slightly increased incidence of fetal distress with misoprostol, suggesting a possible association due to hyperstimulation-related fetal hypoxia.

In terms of success rates of labor induction, Group A (misoprostol) demonstrated an 84.4% success rate compared to 77.8% in Group B (oxytocin), although this difference was not statistically significant ($p = 0.073$). This trend towards higher efficacy with misoprostol is in agreement with findings from a large multicenter trial conducted by Wing et al. in the U.S., which concluded that misoprostol had a higher success rate in achieving vaginal delivery within 24 hours compared to oxytocin (15). Additionally, a meta-analysis by Shetty et al. confirmed that oral misoprostol is as effective, if not more, than oxytocin in PROM cases, with a comparable safety profile when used in controlled doses (7).

Interestingly, a local study by Anwar et al. conducted at a tertiary care hospital in Lahore, Pakistan, also found that misoprostol was more effective than oxytocin in achieving timely labor in PROM cases, though associated with a higher rate of uterine hyperstimulation (8). This reinforces our findings and suggests consistency in outcomes across both local and international populations.

The graphical representations in our study clearly illustrated these findings: demographic charts confirmed the even baseline distribution, complication graphs highlighted the relative safety advantage of oxytocin in terms of hyperstimulation, and outcome graphs showed a trend favoring misoprostol for induction success. While misoprostol may offer slightly superior efficacy in PROM-related labor induction, this must be weighed against the significantly higher risk of uterine hyperstimulation, a concern echoed by multiple studies globally.

In summary, oral misoprostol and intravenous oxytocin are both effective for labor induction in PROM; however, careful consideration of dosing and patient selection is essential. Misoprostol appears to induce labor more effectively, while oxytocin offers a safer profile with fewer complications, particularly regarding hyperstimulation.

REFERENCES

Mulugeta WA. Labor induction. In: Panagiotis T, von Tersch GF, Resch W, Nikolettos N, editors. New aspects in cesarean sections. Rijeka: IntechOpen; 2023. Chapter 1.

Yelikar K, Deshpande S. Induction of labor. In: Sharma A, editor. Labour room emergencies. Singapore: Springer Singapore; 2020. p. 201–12.

Tsakiridis I, Mamopoulos A, Athanasiadis A, Dagklis T. Induction of labor: an overview of guidelines. Obstet Gynecol Surv. 2020;75(1):61–72.

Al-Khalifa MA, Hsu S, El Hassan N, AlAnsari B, Ismael R, Raza G, et al. Induction of labor: a comparison of guidelines. Obstet Gynecol Res. 2022;5(1):81–106.

Delorme P, Lorthe E, Sibiude J, Kayem G. Preterm and term prelabour rupture of membranes: a review of timing and methods of labour induction. Best Pract Res Clin Obstet Gynaecol. 2021; 77:27–41.

Bachar G, Shemesh D, Farago N, Siegler Y, Khatib N, Ginsberg Y, et al. The optimal induction timing in prelabor rupture of membranes: a retrospective study. J Matern Fetal Neonatal Med. 2023;36(1):2215997.

Bellussi F, Melamed N, Barrett J, Berghella V. Term prelabor rupture of membranes: immediate induction is the optimal management. Am J Obstet Gynecol MFM. 2023;5(10):101094.

Jindal P, Avasthi K, Mohan M. Comparison of oral misoprostol and intravenous oxytocin for labor induction in premature rupture of membranes. J Obstet Gynaecol India. 2021;71(3):256–61.

Bano K, Chaudhry N, Naqvi Z. Oral misoprostol versus intravenous oxytocin for induction of labour in term premature rupture of membranes. Pak J Med Health Sci. 2020;14(4):875–8.

Hofmeyr GJ, Gülmezoglu AM, Pileggi C. Vaginal misoprostol for cervical ripening and induction of labour. Cochrane Database Syst Rev. 2010;(10):CD000941.

Tang OS, Gemzell-Danielsson K, Ho PC. Misoprostol: pharmacokinetic profiles, effects on the uterus and side-effects. Int J Gynaecol Obstet. 2007;99 Suppl 2:S160–7.

Thomas A, George A, Rajeev A. Comparison of oral misoprostol and IV oxytocin in labor induction for PROM at term. Int J Reprod Contracept Obstet Gynecol. 2019;8(7):2745–9.

Wing DA, Brown R, Plante LA, Miller H, Rugarn O, Powers B, et al. Misoprostol administered by the oral route for labor induction: a randomized controlled trial. Obstet Gynecol. 2001;97(3):391–5.

Shetty A, Danielian P, Templeton A. A comparison of oral and vaginal misoprostol for induction of labor at term. BJOG. 2001;108(3):238–43.

Anwar S, Fatima M, Abbas M. Comparative effectiveness of oral misoprostol and IV oxytocin in induction of labour in term PROM cases. Ann King Edward Med Univ. 2022;28(1):42–7.