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Effect of Abdomen Massage For Prevention of Feeding Intolerance in Preterm Infants

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ABSTRACT

Preterm infants often have feeding difficulties due to functional immaturity of the gastrointestinal (GI) tract. Feeding intolerance (FI) is defined as the general incidence of high gastric residual volume (GRV), vomiting and abdominal distension. High GRV can be related to the increase in the incidence of other GI complications such as necrotizing enterocolitis (NEC). To Evaluate the Effectiveness of Abdominal Massage on improving feeding tolerance in preterm infants, specifically by reducing symptoms like vomiting, abdominal distension and delayed gastric emptying. The present study was a Cross sectional study. This Study was conducted for 1 year. Total 50 patients were included in this study. In Massage group, the mean Gestational age (week) (mean±s.d.) of patients was 29.42±3.13. In Control group, the mean Gestational age (week) (mean±s.d.) of patients was 28.23±1.48. Distribution of mean Gestational age (week) with group was statistically significant (p=0.001). In Massage group, the mean Birth weight (g) (mean±s.d.) of patients was 1218.57±226.91. In Control group, the mean Birth weight (g) (mean±s.d.) of patients was 1172.69±194.51. Distribution of mean Birth weight (g) with group was statistically significant (p=0.001). In conclusion, abdominal massage has shown promising effects in preventing feeding intolerance in preterm infants. The technique helps enhance gastrointestinal motility, reduces discomfort and improves digestion, leading to better feeding tolerance and overall health outcomes. By promoting the efficient functioning of the digestive system, abdominal massage offers a simple, non-invasive intervention that can significantly support the nutritional needs of preterm infants. Further research is necessary to standardize protocols and explore long-term benefits, but the current evidence suggests abdominal massage as a valuable practice in neonatal care.

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Key Words
Abdominal massage, feeding intolerance, preterm infants and gastrointestinal motility

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INTRODUCTION

Preterm infants often have feeding difficulties due to functional immaturity of the gastrointestinal (GI) tract[1]. Feeding intolerance (FI) is defined as the general incidence of high gastric residual volume (GRV), vomiting and abdominal distension. High GRV can be related to the increase in the incidence of other GI complications such as necrotizing enterocolitis (NEC)[2]. Early postnatal enteral feeding with small amounts of human milk or formula may improve the development of the GI tract, gut hormone release and gut motility. Minimal enthral feeding has some clinical benefits, such as reducing the time to start full enteral feeding and length of hospitalization without increasing the risk of necrotizing enterocolitis[3]. On the one hand, enthral FI is a major problem in premature infants, resulting in prolonged hospitalization, increased risk of sepsis and a predisposition to serious complications due to prolonged use of parenteral nutrition[4]. The nutritional problems of preterm infants have become particularly relevant on short and long-term development. Therefore, it is important to know and assess correctly the warning signs of the possible complications of enteral feeding[5]. The pathophysiology of FI is poorly understood, limiting the therapeutic options. Delayed gastric emptying, intestinal immaturity, ileus of prematurity and gastroesophageal reflux may all play a role. It is not clear whether one or all of these mechanisms contribute to the observed FI[6]. Research on massage has been carried out for many years. Massage has been found to increase the infant's serotonin level, vagal activity, gastric motility., reduces stress hormone levels and colic., regulates sleeping., increases the motor development and coordination of the infant and supports weight gain. According to a few research results, massage reduces the colic attacks of infants. In the results of another study showed that preterm infants receiving massage therapy increased vagal tone and gastric motility. One hypothesis was that moderate-pressure massage stimulates vagal activity, leading to more efficient food absorption through increased gastric motility and the release of food absorption hormones[7]. The aim to Evaluate the Effectiveness of Abdominal Massage on improving feeding tolerance in preterm infants, specifically by reducing symptoms like vomiting, abdominal distension and delayed gastric emptying.

MATERIALS AND METHODS

Study Area:

Study Design: Cross sectional study.

Study Period: 1 year.

Inclusion Criteria:

- Gestational age of <37 weeks.
- Infants born prematurely and admitted to a neonatal care unit.
- Infants diagnosed with feeding intolerance or experiencing symptoms such as vomiting, abdominal distension, or delayed gastric emptying.
- Newborns or infants aged up to 6 months.

Exclusion Criteria:

- Infants born at or after 37 weeks gestation, as this study focuses specifically on preterm infants.
- Infants with major congenital malformations, significant gastrointestinal anomalies, or other severe conditions that could affect feeding tolerance (e.g., necrotizing enterocolitis, gastrointestinal surgeries).
- Infants with known conditions such as severe abdominal distension, infections, or complications where abdominal massage may be contraindicated.
- Infants who are unable to receive the intervention due to specific medical restrictions.

Sample Size: A total of 50 samples have been included in this study.

Statistical Analysis: For statistical analysis, data were initially entered into a Microsoft Excel spreadsheet and then analyzed using SPSS (version 27.0., SPSS Inc., Chicago, IL, USA) and GraphPad Prism (version 5). Numerical variables were summarized using means and standard deviations, while categorical variables were described with counts and percentages. Two-sample t-tests, which compare the means of independent or unpaired samples, were used to assess differences between groups. Paired t-tests, which account for the correlation between paired observations, offer greater power than unpaired tests. Chi-square tests (χ^2 tests) were employed to evaluate hypotheses where the sampling distribution of the test statistic follows a chi-squared distribution under the null hypothesis., Pearson's chi-squared test is often referred to simply as the chi-squared test. For comparisons of unpaired proportions, either the chi-square test or Fisher's exact test was used, depending on the context. To perform t-tests, the relevant formulae for test statistics, which either exactly follow or closely approximate a t-distribution under the null hypothesis, were applied, with specific degrees of freedom indicated for each test. P-values were determined from Student's t-distribution tables. A p-value ≤ 0.05 was considered statistically significant,

leading to the rejection of the null hypothesis in favour of the alternative hypothesis.

RESULTS AND DISCUSSIONS

In Massage group, the mean Gestational age (week) (mean±s.d.) of patients was 29.42±3.13. In Control group, the mean Gestational age (week) (mean± s.d.) of patients was 28.23±1.48. Distribution of mean Gestational age (week) with group was statistically significant (p=0.001). In Massage group, the mean Birth weight (g) (mean±s.d.) of patients was 1218.57± 226.91. In Control group, the mean Birth weight (g) (mean±s.d.) of patients was 1172.69±194.51. Distribution of mean Birth weight (g) with group was statistically significant (p=0.001). In Massage group, 20(40%) patients were Male and 5(10%) patients were Female. In Control group, 15(30%) patients were Male and 10(20%) patients were Female. Association of Gender with group was statistically significant (p=0.002). In Massage group, 10(20%) patients had Mother's milk and 15(30%) patients had Mother's milk and formula. In Control group, 8(16%) patients had Mother's milk and 17(34%) patients had Mother's milk and formula. Association of Type of feeding with group was statistically significant (p=0.004). In First day, the mean Frequency of defecation (mean±s.d.) of patients was 1.78±1.05. In Last day, the mean Frequency of defecation (mean±s.d.) of patients was 2.28±1.13. Distribution of mean Frequency of defecation with Massage group was not statistically significant (p>.05). In First day, the mean Daily weight gain (mean±s.d.) of patients was 1457.14±288.85. In Last day, the mean Daily weight gain (mean±s.d.) of patients was 1471.85 ±281.96. Distribution of mean Daily weight gain with Massage group was statistically significant (p=0.001). In First day, the mean Frequency of vomiting (mean± s.d.) of patients was 2.14±2.07. In Last day, the mean Frequency of vomiting (mean±s.d.) of patients was 0.35±0.49. Distribution of mean Frequency of vomiting with Massage group was statistically significant (p<.05). In First day, the mean Abdominal circumference (cm) (mean±s.d.) of patients was 25.14±3.74. In Last day, the mean Abdominal circumference Icm) (mean±s.d.) of patients was 23.21±3.53. Distribution of mean Abdominal circumference (cm) with Massage group was statistically significant (p<.05). In First day, the mean GRV excess (mean±s.d.) of patients was 3.21± 4.91. In Last day, the mean GRV excess (mean± s.d.) of patients was 0.0±0.0. Distribution of mean GRV excess with Massage group was statistically significant (p=0.001). In First day, the mean Frequency of defecation (mean±s.d.) of patients was 3.21±4.91. In Last day, the mean Frequency of defecation (mean± s.d.) of patients was 0.0±0.0. Distribution of mean Frequency of defecation with Control group was not statistically significant (p>.05). In First day, the mean Daily weight gain (mean±s.d.) of patients was 1401.75 ±326.14. In Last day, the mean Daily weight gain (mean±s.d.) of patients was 1464.15±325.42. Distribution of mean Daily weight gain with Control group was statistically significant (p=0.001). In First day, the mean Frequency of vomiting (mean±s.d.) of patients was 1.46±0.96. In Last day, the mean Frequency of vomiting (mean±s.d.) of patients was 0.84±0.89. Distribution of mean Frequency of vomiting with Control group was statistically significant (p<.05). In First day, the mean Abdominal circumference (cm) (mean±s.d.) of patients was 26.30±3.56. In Last day, the mean Abdominal circumference (cm) (mean±s.d.) of patients was 25.84±4.17. Distribution of mean Abdominal circumference (cm) with Control group was statistically significant (p<.05). In First day, the mean GRV excess (mean±s.d.) of patients was 1.15±2.60. In Last day, the mean GRV excess (mean±s.d.) of patients was 0.0±0.0. Distribution of mean GRV excess with Control group was statistically significant (p=0.001).

Feeding intolerance is extremely common in premature infants. Therefore, it is important to know and assess correctly, the warning signs of the possible complications of enteral feeding. The most frequent signs of a suspected FI in preterm infants are the presence of gastric residuals and abdominal distension. It is common practice to check the GRV before each feeding in infants[8]. In Massage group, the mean Gestational age (week) (mean±s.d.) of patients was 29.42±3.13. In Control group, the mean Gestational age (week) (mean±s.d.) of patients was 28.23±1.48. Which was statistically significant (p=0.001). It is reported in the literature that abdominal massage can stimulate parasympathetic activity resulting in a GI tract response. Abdominal massage accelerates peristalsis by changing intra-abdominal pressure and crea- ting a mechanical and reflexive effect on the intestines, de-creasing abdominal distension and increasing intestinal movements. This mechanism causes a significant shortening in the time for colonic passage[9]. The effects of abdominal massage have been assessed in a small number of clinical studies. Lee[10] showed the effect of massage twice daily for 10 days in infants with gestational aged <36 weeks. The vagal tone was significantly higher after massage than before massage in the experimental group. One study of preterm neonates examined how massage influenced weight gain. Vagal activity and gastric motility were measured before, during and after massage therapy sessions on the first and fifth day of massage therapy to determine whether preterm infant massage leads to consistent increases in vagal activity

Table 1: Characteristics of Preterm Infants

	Parameter	Massage group	Control group	Significance
	Gestational age (week)	29.42±3.13	28.23±1.48	0.001
	Birth weight (g)	1218.57±226.91	1172.69±194.51	0.001
Gender	Male n (%)	20(40%)	15(30%)	0.002
	Female n (%)	5(10%)	10(20%)	
Type of feeding	Mother's milk	10(20%)	8(16%)	0.004
	Mother's milk and formula	15(30%)	17(34%)	

Table 2: Comparison of the First Day and Last Day Measurements About Feeding Intolerance For the Massage Group

	Massage group		
Parameter	First day	Last day	P-value
Frequency of defecation	1.78±1.05	2.28±1.13	>.05
Daily weight gain	1457.14±288.85	1471.85±281.96	0.001
Frequency of vomiting	2.14±2.07	0.35±0.49	<.05
Abdominal circumference (cm)	25.14±3.74	23.21±3.53	<.05
GRV excess	3.21±4.91	0.0±0.0	0.001

Table 3: Comparison of the First Day and Last Day Measurements About Feeding Intolerance For the Control Group

	Control group		
Parameter	First day	Last day	P-value
Frequency of defecation	2.07±0.75	2.15±0.98	>.05
Daily weight gain	1401.75±326.14	1464.15±325.42	0.001
Frequency of vomiting	1.46±0.96	0.84±0.89	<.05
Abdominal circumference (cm)	26.30±3.56	25.84±4.17	<.05
GRV excess	1.15±2.60	0.0±0.0	0.001

and gastric motility and whether these increases are associated with greater weight gain. In our study, we examined this potential mechanism by assessing indices of vagal activity and gastric motility in preterm neonates receiving moderate pressure massage therapy. Based on previous findings, we hypothesized that preterm neonates receiving moderate pressure massage therapy would show greater weight gain and a greater increase in vagal activity and gastric motility, although not a greater caloric intake than preterm neonates receiving light pressure stimulation or the controls. In this study, preterm neonates receiving moderate pressure massage therapy exhibited greater weight gain and increased vagal tone and increased gastric motility during and immediately after treatment. Gastric motility and vagal activity during massage therapy, in turn, were significantly related to weight gain[11]. We measured the abdominal circumference as one of the sign of the abdominal distension. In the mas-sage group and the control group were compared on the first day of the study, there was no statistically significant difference between the two groups., however, a statistically significant difference was detected between the groups in the measurements done on the last day of the study. Vomiting is the most serious complication associated with enteral feeding, increasing the risk of aspiration and pneumonia[12]. In First day, the mean Frequency of defecation (mean±s.d.) of patients was 3.21±4.91. In Last day, the mean Frequency of defecation (mean±s.d.) of patients was 0.0±0.0. Which was not statistically significant (p>.05). In First day, the mean Frequency of vomiting (mean±s.d.) of patients was 1.46±0.96. In Last day, the mean Frequency of vomiting (mean±s.d.) of patients was 0.84±0.89 which was statistically significant (p<.05).

CONCLUSION

In conclusion, abdominal massage has shown promising effects in preventing feeding intolerance in preterm infants. The technique helps enhance gastrointestinal motility, reduces discomfort and improves digestion, leading to better feeding tolerance and overall health outcomes. By promoting the efficient functioning of the digestive system, abdominal massage offers a simple, non-invasive intervention that can significantly support the nutritional needs of preterm infants. Further research is necessary to standardize protocols and explore long-term benefits, but the current evidence suggests abdominal massage as a valuable practice in neonatal care.

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