



Effect of implementing acupressure therapy on gastrointestinal tolerance and growth monitoring for premature neonates

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Abstract

Background: Premature neonates gastro intestinal tract are immature which may lead to Feeding intolerance, which affects growth, therefore, acupressure therapy has been used for improvement that.

Aim of the study: Was to determine the effect of acupressure therapy on gastrointestinal tolerance and growth monitoring among premature neonates.

Subject and Methods: Sixty premature Neonates study was conducted at the Neonatal Intensive Care Unit of Tanta University Hospital.

Tools: Three tools were used for data collection. Bio-socio-demographic Data, feeding pattern and growth monitoring of premature neonate.

Results: Premature neonates in study groups had less feeding intolerance and reached to full feeding faster compared to premature neonates in control group.

Conclusion: Premature neonates who received acupressure therapy took less time to reach full feeding and exhibited less feeding intolerance criteria and increased in growth parameters compared to premature neonates in control group.

Recommendations: Neonatal intensive care unit nurses' should attend training courses regarding acupressure therapy to gain knowledge about importance of acupressure and how to practice it effectively and Combination between medical and routine nursing care of premature neonates and acupressure technique should be considered in the policy of the Neonatal Intensive Care Units.

Keywords: Acupressure therapy, feeding tolerance, premature neonates

Introduction

Premature neonates are defined by the World Health Organization (WHO) as birth occurring before 37 completed weeks of gestational or fewer than 259 days^[1]. The term of "gestational age" from the first day of the last menstrual period to birth. The neonatal period is described as the time from birth to the first month of extra uterine life. The fetal stage and life outside form continuum during which a dynamic series of biological, physiological and metabolic changes take place. The neonatal stage is critical time for neonates as it completes many of the physiological adjustments needed for life outside^[1].

Premature neonates one of the most important challenges of modern pediatrics, though its high incidence, but also because of its implications on neonatal morbidity and mortality. Premature neonates are a medical emergency and an advanced medical proficiency with suitable infrastructure is required for survival against the numerous of the extra uterine environment. It is becoming evident that adequate nutrition starting in the first hours of life is major importance for short and even more so for long-term health outcomes of the premature newborn^[2].

Premature neonates are the direct cause of neonatal death in

more than 27% of the cases born globally. It is also a major determinant of short and long-term morbidity in infants and children. The burden of premature birth includes neonatal morbidity and long-term sequel, including neurodevelopment deficits (e.g., cerebral palsy, impaired learning, and visual disorders). Premature neonates develop short term complications due to functional immaturity; for example hypothermia, respiratory and cardiovascular and metabolic problems, necrotizing enter colitis and infections^[3].

After acute period of premature neonates feeding are key components for preventing more specific pathologies and effective growth. Providing appropriate nutrition is a cornerstone in the care of premature neonates^[4]. Feeding intolerance is one of the common symptoms reported at Neonatal Intensive Care Unit (NICU) because of digestive absorptive immaturities of premature neonates. The optimization of enteral nutrition without parenteral nutrition has become a priority in premature neonates^[3]. Proper nutrition is necessary to normal growth, infection resistance, long term wellbeing, neurologic and cognitive development, providing sufficing nourishment to premature neonates are difficult situation because of several problems such as

bowel function is immature, in coordination between swallow and suck and high risk of feeding intolerance.

Feeding intolerance is common between premature neonates, the majority of them either way feeding will be stopped temporarily or delay in advancing feeding. Feeding intolerance is determined by large gastric residuals, greenish gastric contents, vomiting and abdominal distension. Gastric motor abnormalities are common between premature neonates result of the absence of regular gastric slow wave activity as gastric motility is controlled by gastric myoelectrical activity. Gastrointestinal dysmotility is reflected by less efficient gastric emptying and slower intestinal transit as gastric emptying according to intact motor function are many complementary therapies to increase feeding tolerance and effective bowel movement including massage therapy and acupressure [4].

Acupressure therapy is defined as traditional Chinese medicine (TCM) body work technique based on the principles of acupuncture; acupressure is widely used in Chinese society as methods of preserving general health. Acupressure which literally means finger pressure is the use of practitioners' finger trips along certain acupoint and meridian lines in order to release changed energy that has been increased, decreased or blocked. Acupoint and meridian are linked via five important organs which are liver, heart, spleen, lung and kidney [5].

Acupressure is the application of pressure rather than needles on specific points on the body to control symptoms such as pain or nausea. Acupressure can stimulate the parasympathetic activity and induce more effective response of the digestive system by accelerating peristalsis, decreasing abdominal distension, accelerating the bowel transit time, increase the frequency of defecation and decreasing the frequency of vomiting episodes in the day time and significant effect on increasing the body weight [5]. According to researchers that acupressure and body massage as non-medical intervention.

Aim of the study

The study was aimed to

Determine the Effect of implementing acupressure therapy on gastrointestinal tolerance and growth monitoring among premature neonates.

Research Hypothesis

Gastrointestinal tolerance and growth parameter as weight, mid arm circumference are expected to be improved premature neonates who receive acupressure therapy.

Subjects and Method

Subjects

Research design

A quasi- experimental research design was used in the present study.

Setting

The study was conducted at Neonatal Intensive Care Unit of Tanta University Hospitals.

Subjects

Convenience sampling of sixty premature neonates from the previously mentioned setting who fulfilled the following

criteria comprised the study subjects:

- Gestational age less than 37 weeks.
- Birth weight ranging from 1000 to less than 2500 gm.
- Premature neonates who started enteral feeding.
- Free from congenital anomalies that can interfere with the implementation of acupressure.
- Not attached to mechanical ventilator.

Premature neonates were divided into two equal groups

- **Control group:** Thirty premature neonates who were received the routine nursing care and received medication at NICU.
- **Study group:** Thirty premature neonates who were received acupressure therapy one hour before feeding once a day per session.

Assessment phase

Tools of data collection

Three Tools were used to obtain the necessary data.

Tool I: part I: sociodemographic characteristic for premature neonates it includes

Sex, age when admitted to Neonatal Intensive Care Unit

Part II: Medical history of premature neonates

Gestational age, birth weight, length, chest circumference, mid arm circumference, diagnosis.

Tool II: Feeding pattern and intolerance of premature neonates which include two parts

Part (1): Premature neonate feeding pattern which include

- Time of start feeding
- Type of feeding: breast or artificial or complementary feeding
- Duration to reaching full feeding

Part (2): Feeding intolerance criteria which include

- Abdominal distension (increase of abdominal girth >2cm before and after feeding)
- Increase Gastric residual volume (more than 30% of total feed)
- Abnormal defecation (constipation or diarrhea)
- Vomiting

Tool III: Growth monitoring of premature neonates

- Daily measurement of weight, length, mid arm and chest circumference

Method

Planning phase

1. An official permission to conduct the study was obtained from the responsible authorities of the neonatal intensive care unit after explanation of the aim of the study.
2. Ethical and legal considerations:
 - Consent of premature neonate's parent was obtained after explaining the aim and nature of the study.
 - Privacy and confidentiality were protected.
 - Professor of physiotherapy and rehabilitation was trained the researcher on acupressure therapy for

- premature neonates before starting the study.
 - Nature of the study was not causing any harm or pain to the entire sample.
1. Content validity
 2. Tools of study was developed and tested for its content validity.
 3. Reliability
 4. The study tools tested by the pilot subject (Cronbachs alpha) were=0.950 and 0.92 respectively.
 5. Apiolt study was carried out on 10% premature neonates to test the feasibility and clarity of tools according necessary modification was done. Pilot study was excluded from the study
 6. phases of the study
 7. At initial contact, premature neonates, socio demographic data, feeding pattern and feeding intolerance of premature neonates, and growth monitoring of premature neonates were assessed for two group using (Tool I, II and III).
 8. Every premature neonate was fed according to feeding schedule that was approved by the neonatologist at the unit the acupressure therapy indicated when enteral feeds was started.

Control group

Premature neonates was received only routine nursing care and received medication at Neonatal Intensive Care until reach to full feeding.

Study group

Premature neonate was received acupressure therapy in additional to routine unit care for 7 days, once day for 15 minute per session the session was performed in the morning shift one hour before starting feeding.

Statistical analysis

The collected data will be, tabulated, and statistically analyzed using SPSS program (Statistical Package for Social Sciences) software version 26.0, Microsoft Excel 2016.

Descriptive statistics were done for numerical parametric data as Mean ± SD (standard deviation) and minimum & maximum of the range and for numerical nonparametric data as median and 1st& 3rd inter-quartile range, while they were done for categorical data as number and percentage.

Results

Table (1) illustrates socio-demographic characteristics of premature neonates of the study and control groups. it was revealed that 56.7%of premature neonates were females in the study group compared with 60% neonates were females in the control group. Concerning age, one half of premature neonates of the study group (50%) and about two third of premature neonates of the control group (63.3%), had age ranged from (1-5) days.

Table (2) show percentage distribution of premature neonates regarding growth parameter it is revealed that, one half of premature neonates of the study group (50%) and

about two third of premature neonates of the control group (60%) had birth weight ranged from1850 to2200 grams. Regarding the mid arm circumference, their mean were7.65±0.54 cm and 7.68±0.65cm in the study and control groups respectively.

Table (3) revealed effect of acupressure on weight among premature neonates. it was concluded that the total of body weight in the last seven days with mean in the study group was 1989.3±169.89 compared to 1947.50±152.25 grams among premature neonates in the control group, the difference between tow group show statistical significant in the study group than control group (p=0.001in the last seven day) and (x2=2.712).

Table (4) illustrate more than three quarter of premature neonates in the study group reach to full feeding within a period less than days 10(80%) compared to premature neonates in the control group (36.7%). The mean duration to reach full feeding in the study group was7.67±2.84 compared to premature neonates in the control group was9.63±2.39 with high statistical significant difference between study and control groups (p=0.004) and x²=2.859.

Table (5) show the effect of acupressure on feeding tolerance regarding abdominal distension among premature neonates of the study period revealed that second and third day was (0.0%), (13.3%) compared to (26.7%), (50.0%) of premature neonates of the control group with statistical significant lower in the study group compared to control group (p=0.003&0.005) and (x2= 3.247&4.097) respectively. As illustrated in figure (1).

Table (6) illustrated correlation of premature neonates of the study group regarding total weight, Length, mid arm circumference and Chest circumference in the last seven days. It was clear that, there were statistical signify cant differences between total weight and Length (r=.568). Also there were a statistical significant difference between total weight and, mid arm circumference (r=.872), and statistical significant difference between total weight and chest circumference (r=.912).

Table 1: Percentage distribution of premature neonates regarding socio- demographic characteristics

Socio-demographic characteristics	Study group (n = 30)		Control group (n = 30)		
	No.	%	No.	%	
Gender					
Male	13	43.3%	12	40.0%	
Female	17	56.7%	18	60.0%	
Age (days)					
1-5	15	50%	19	63.3%	
6-10	11	36.7%	6	30%	
11-15	4	13.3%	2	6.7%	
Min-Max	1.0- 15.0		1.0- 8.0		
Mean ± SD	5.83±4.12		4.10±2.31		
Gestational age (weeks)					
29-32	2		6.7%	2	6.7%
33-36	28		93.3	28	93.3
Min-Max	32.0- 36.0		32.0- 36.0		
Mean ± SD	34.83±1.21		34.67±1.30		

Table 2: Percentage Distribution of Premature Neonates Regarding Growth Parameters

Growth parameters	Study group (n = 30)		Control group (n = 30)	
	No.	%	No.	%
Birth weight (Gm)				
1500-1800	15	50%	12	40%
1850-2200	15	50%	18	60%
Min-Max	1550.0- 2150.0		1550.0- 2200.0	
Mean ± SD	1831.67±149.41		1853.33±142.59	
Length (cm)				
42-43.5	6	20%	6	20%
44-46	24	80%	24	80%
Min-Max	42.0- 45.5		42.0- 46.0	
Mean ± SD	44.40±1.04		44.62±1.06	
Chest circumference (cm)				
27-28	11	36.6%	10	33.6%
28.5-29.5	19	63.4%	20	66.4%
Min-Max	27.0- 29.5		27.0- 29.5	
Mean ± SD	28.35±0.78		28.48±0.83	
Mid arm circumference (cm)				
7-8	25	83.3%	23	76.7%
8.5-9	5	16.7%	7	23.3%
Min-Max	7.0- 9.0		7.0- 9.0	
Mean ± SD	7.65±0.54		7.68±0.65	

Table 3: Percentage Distribution of Premature Neonates Regarding Weight

Weight (gram)	Study group (n = 30)	Control group (n = 30)	t. test	P-value
	Mean ±SD	Mean± SD		
1 st day	16.67±4.42	9.67±2.92	8.226	0.001*
2 nd day	21.17±3.87	13.33±3.03	8.527	0.001*
3 rd day	20.67±3.88	13.00±2.82	9.150	0.001*
4 th day	18.67±3.92	11.50±3.51	8.394	0.001*
5 th day	20.00±3.71	14.50±3.79	5.856	0.001*
6 th day	25.00±2.28	13.00±2.81	19.884	0.001*
7 th day	26.00±2.42	14.33±3.88	13.328	0.001*
Initial Assessment of Weight	1831.67±149.41	1853.33±142.59	1.147	0.563
Total Weight of neonates in the last seven days	1989.3±169.89	1947.50±152.25	2.712	0.001*

Table 4: Percentage Distribution of premature neonates according to duration reach full feeding

Premature neonates feeding pattern	Study group (n = 30)		Control group (n = 30)	
	No.	%	No.	%
Duration to reach full feeding (days)				
<Day 10	24	80%	11	36.7%
Day 10 -14	6	20%	19	63.3%
Min-Max	3.0- 14.0		7.0- 10.0	
Mean ± SD	7.67±2.84		9.63±2.39	
test value	T x = 2.859			
P-value	0.004**			

Highly significant at $p < **0.001$, significant at $p < *.05$

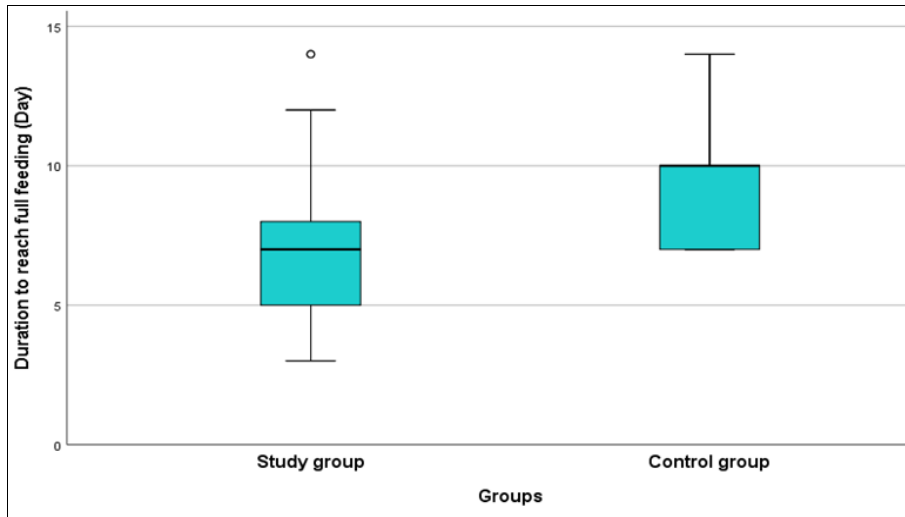


Fig 1: Premature Neonates in studied groups according to duration to reach full feeding

Table 5: Percentage distribution of premature neonates according to abdominal distension

Abdominal distension		Study group (n = 30)		Control group (n = 30)		T. test	P-value
		No.	%	No.	%		
1 st day	No	30	100%	30	100%	-	-
	Yes	0	0.0%	0	0.0%		
2 nd day	No	30	100%	22	73.3%	3.247	0.003*
	Yes	0	0.0%	8	26.7%		
3 rd day	No	26	86.7%	15	50.0%	4.097	0.005*
	Yes	4	13.3%	15	50.0%		
4 th day	No	26	86.7%	21	70.0%	1.702	0.696
	Yes	4	13.3%	9	30.0%		
5 th day	No	30	100%	30	100%	-	-
	Yes	0	0.0%	0	0.0%		
6 th day	No	29	96.7%	30	100%	1.00	0.326
	Yes	1	3.3%	0	0.0%		
7 th day	No	30	100%	30	100%	-	-
	Yes	0	0.0%	0	0.0%		

Significant at p* < 0.05

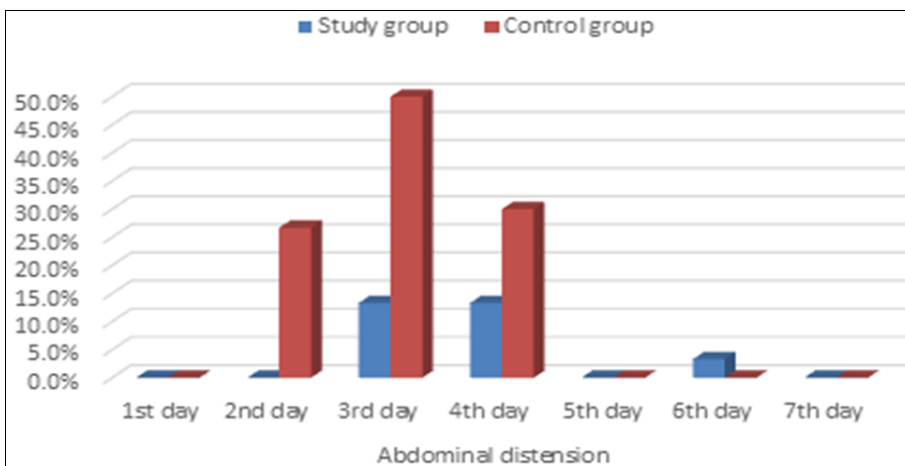


Fig 2: premature neonates according to abdominal distension

Table 6: Correlation of premature Neonates Regarding Weight, Length, Mid arm and Chest Circumference

Growth monitoring	weight (gm.)	
	r	P. value
Length (cm)	.568**	.000
Mid arm circumference (cm)	.872**	.000
Chest circumference (cm)	.912**	.000

Discussion

Prematurity is a worldwide prenatal problem in which premature neonates encounter numerous challenges due to their small size and under developed bodies [7]. Premature neonates will be vulnerable to intensive care environment, where they will struggle to achieve unrealistic development depending on their degree of prematurity [8]. Premature

neonates have impaired gastro intestinal tract motility that is characterized by motor inactivity with peristalsis that does not migrate, delayed stomach emptying, unable to tolerate feeding and affecting of their growth^[9].

The Neonatal Intensive Care Unit (NICU) nurses' had major role in provides various forms of additional stimulation to hospitalized premature neonates. Acupressure is one of the stimulating therapies that have been shown to be useful in the treatment of a variety of issues including gastro intestinal tract problems. Acupressure is an energetic massage that is used to target specific acupoints and meridian of the body in order to promote gastro intestinal tract functioning. Thus the current study was conducted to determine the effect of acupressure therapy on gastrointestinal tolerance of premature neonates and growth parameters.

Table (1) illustrates socio-demographic characteristics of premature neonates of the study and control groups. it was revealed that 56.7% neonates were females in the study group and 60% neonates in the control group were female and majority of premature neonates of both the study and control groups had gestational age ranged from 33 to 36 weeks (93.3% for each). This similarity is due to matching neonates in the study and control groups in terms of gestational age and current body weight that was done between premature

Daily evaluation of weight gain is the standard of care in the NICU. Premature neonates with low birth weight failure to acquire enough extra-uterine growth. Growth monitoring is a part of the standard medical and nutritional assessment and care of premature neonates. The finding of the present study highlight that there was significant increase in the weight of premature neonates who received acupressure (Table 2). This finding may be interpreted by the fact that acupressure can trigger certain mechanisms such as, improvement of GIT motility and regularity as well as the release of food absorption hormones which can be explained by the effect of moderate pressure massage. Moderate pressure massage stimulates the release of ornithine decarboxylase (anp index of growth hormone)^[10] It also stimulates the vagus nerve leading to increased vagal activity and in turn to increased gastric motility and the release of insulin (food absorption hormone) and Insulin-like Growth Factor1(IGF-1)^[11].

Time to reach full feeds has significant effect on long term neurodevelopment outcome in premature neonates. Time to achieve full enteral feeding is an indicator for gastrointestinal tolerance. The finding of this study revealed that, premature neonates of study group reached to full feeding faster than premature neonates of control group with statistical significant differences these findings could be due to the effect of acupressure which improved premature neonates circulation and increased blood supply to the stomach that accelerates gastric motility, digestion and decrease gastric residual volume^[12]. This finding is consistent with the finding of Kumar *et al.*, (2021)^[13] Who pointed out that moderate pressure massage can increase gastric motility and better absorption of nutrients.

Regarding abdominal distension, it was observed from the results of the present study that the percentage of premature neonates of the study group who had abdominal distension decreased in the second and third days of the study period

compared to premature neonates of the control group with statistical significant differences. This finding may be related to effectiveness of acupressure technique in the improvement of (GIT) motility which consequently decreases the possibility of intestinal gases accumulation. These result in harmony with the finding of Manheimer. Who reported that application of acupressure showed promise in the area of GIT symptoms management as they were effective in alleviating abdominal bloating when stimulating certain GIT meridians and acupoints.

The result of the present was in line with Castilho *et al.* Who reported that premature neonates receiving moderate pressure massage therapy exhibited greater weight gain and increase vagal tone. Also agreement with Liu *et al.* 16 Conducted a study about effect of zusanlia acupoint stimulation on improving the body weight among premature neonates who received acupressure compared to premature neonates of control group.

Conflict of Interest

Not available

Financial Support

Not available

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