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Psychological Factors and Acceptane Rate at Early Stage of COVID-19 Vaccine: A questionnair-based survey study

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Abstract

Introduction: The COVID-19 pandemic had a major impact on the health-care system that significantly reduced the capacity to continue delivery of health-care services to common people. ***Objectives***: The study aimed to understand knowledge, anxiety and wiliness about COVID-19 vaccine among frontline health-care workers.

Methods: This non-experimental cross-sectional online survey was conducted among frontline health-care workers in India. Snowball sampling technique was used to recruit participants for the study and data were collected through online social media platforms. Independent paired t-test was used to compare between anxiety with exposed to COVID-19, diagnosed with COVID-19, willingness, and knowledge. Multiple logistic regression model was used to assess the potential effects between the anxiety and other independent variables.

Results: Out of 884 responses, 844 respondents were included after removing incomplete and duplicate responses. An association was found between anxiety with age, education, income, and occupation. Except for those diagnosed with COVID-19, other parameters were found significant with anxiety. Similarly on comparison between willingness and not willingness with independent parameter, except for anxiety, all other variables were found significant (P=0.05). Anxiety was found potentially significant with independent variables. Higher anxiety i.e. 0.6 times higher anxiety was found among those exposed to COVID-19, 2.2 times higher anxiety found among those willing to vaccinate, 0.7 times higher anxiety found among those with income less than 10,000, and 0.8 times higher anxiety among those who were student by occupation ($p<0.05$).

Conclusion: Though the vaccinecan boost our immune system and would significantly reduce the strain on the health-care system, It's important to find ways to keep the stress at bay—not only for emotional wellbeing, but also to make sure to get the full benefits of the vaccine.

Background: The Sever acute respiratory syndrome coronavirus 2(SAR-CoV-2) is the prime causative virus for the COVID-19 on going pandemic. It was reported in December 2019 in Wuhan, China for first time, later spread through the world. The COVID-19 pandemic result in a devasting effect on normal life of human being and it has been claimed millions of lives. Health authorities from the city of Wuhan, China, informed World Health Organization (WHO) about an increase in pneumonia cases of unknown origin on December 31, 2019. Health authorities in China detected novel coronavirus as the causative agent for the pneumonia cases and the virus was initially named "2019-nCoV", which was later renamed as coronavirus disease 2019 (COVID-19). Owing to the virus virulency and its contagious nature, WHO declared novel coronavirus outbreak a public health emergency of international concern. With the steep rise in number of people infected with the virus outside China, WHO stated the eruption as a pandemic on March 11, 2020[1].

Combating a pandemic would require inter-sectoral co-ordination and vaccine hold one among the key's to resolve the pandemic crisis. In 2015, the World Health Organization (WHO) Strategic Advisory Group of Experts on Immunization outlined vaccine hesitance as a 'time lag in credence or turn down of vaccination despite handiness of vaccination services[2] that varies in form and intensiveness based on from where and when it occurs and what vaccine is involved with, as reported in various studies.[3, 4]

Keywords: COVID-19; Vaccine; Anxiety; Depression; Willingness.

Introduction

In 2019, WHO identified vaccine hesitancy as one among the top ten global health threats[5]. There has been widespread reports of hesitancy and misinformation from various countries that has presented substantial obstacle to achieve coverage and community immunity[6,7]. Governments, public health officials and advocacy groups must be prepared to address hesitancy and build vaccine literacy so that the public will accept immunization when appropriate. Anti-vaccination activists are already campaigning in multiple countries against the need for a vaccine, with some denying the existence of COVID-19 altogether[8]. Misinformation spread through multiple channels could have a considerable effect on the acceptance of a COVID-19 vaccine[9]. The accelerated pace of vaccine development has further heightened public anxieties and could compromise acceptance[10, 11].

Health behaviors and psychological factors play a major role in the immune response towards vaccine administered. Regrettably, the unvarying tenseness of piloting our interrupted routine and social lives during the COVID-19 pandemic may have set us back when it comes to maintaining healthy behaviors. An impaired immune response could interfere with the development of antibodies against pathogen, swift erosion of antibody protection that does develop, and intensified vaccine side-effects[12]. The COVID-19 pandemic has dramatically changed and challenged the health care system, which has also interrupted the provision of basic health-care services.Lockdown is been attributed as one among the several reasons that severely disturbed normal services. Approximately 20% countries reported shortage of medications, diagnostics tools and other technology during this crisis times. COVID-19 pandemic has caused unprecedented hazards in the mental health of people across the globe, owing to the number of death and economic impacts caused by it.

Healthcare workers (HCWs) would be the primary group to be administered with vaccine. So, it would be of prime importance to assess their psychological factors and address their barriers for a widespread acceptance and a better immune response towards the vaccine administered.

Method

After obtaining permission from the competent authority, an online survey was carried out from January 1, 2021 to January 28, 2021 among the frontline health-care workers in India. Snowball sampling technique was adopted for the study. Various online platforms viz. Gmail, Whatsapp, and Facebook were used up to capture data from the eligible participants. After obtaining informed

consent from the participants, they were asked to fill in the questionnaire that comprised of Demographic proforma, Knowledge questionnaire, Generalized Anxiety Disorder scale (GAD-7) and Willingness questionnaire. Though we had instructed the participants to send the filled questionnaire form within 5 days, 40% of the participants had to be reminded again through personal message to get the completed questionnaire form.

Of the total 30 questions; there were 9 questions intended to capture the demographic profile of the participants, 8 items intended to assess participant's knowledge on COVID-19 vaccine, 7 items on generalized anxiety, and 6 items to assess their willingness towards COVID-19 vaccine.

Items were prepared in a Google form and its Uniform Resource Locator (URL) was send through various online platforms. Each participant would require an approximate 15-20 minutes, to fill up the entire questionnaire.

Data collected through Google form was organized in a real time excel sheet. Data was checked for appropriateness and completeness of all intended information. Missing and duplicate data's were removed. Descriptive statistics were used to assess the frequency, percentage, mean, and standard deviation. Chi-square was used for analyzing relation between the anxiety score and categorical variables viz. age, gender, income, occupation, and religion. Independent t-test was used to compare between anxiety, willingness, and other parameters.Multiple logistic analyses were used to measure the potential risk factors of patient. All the results were considered statistically significant when P-value = 0.05.

Result

Table 1: Socio-demographic characteristics of the frontline health-care workers and knowledge.

Variables	Anxiety on vaccination			Chi-square	P-value
	With anxiety	Without anxiety	Total		
Age					
16-30	352	241	593		
31-40	109	103	212	9.97	0.01
40-45	25	8	33		
>45	2	4	6		
Gender					
Male	169	128	297		
				0.15	0.69
Female		319	228	547	
Education					
Primary	74	63	137		
Secondary	307	200	507	9.81	0.01
Graduation	107	93	200		
Religion					
Hindu	396	286	682		
Muslim	43	25	68	2.08	0.35
Christian	49	45	94		
Occupation					
Health worker	153	83	236		
Teacher	54	46	100	7.36	0.05
students	238	186	424		
Others	41	43	84		
Income					
<10000	237	170	405		
10001=25000	148	83	231	12.2	0.01
25001-50000	70	65	135		
>50000	33	38	71		

Table 2: Frequency, percentage, mean and SD of uni-variate variables.

Variables	Frequency & percentages			Mean and SD
	Remark	Frequency	Percentage	
Exposed to COVID-19	No	668	79.1	1.209±0.40
	Yes	176	20.9	
Diagnosed with COVID-19	No	812	96.9	
	Yes	26	3.1	1.031±0.17
Knowledge	No	358	42.6	1.574±0.49
	Yes	486	57.4	
Anxiety	No	356	42.2	1.580±0.49
	Yes	488	57.8	
Willingness	No	107	12.7	1.870±0.33
	Yes	737	87.3	

Table 3: Comparison of anxiety and willingness with independent variables.

Variables		Anxiety on COVID-19 vaccination				Independent t value	P value
		With anxiety		No anxiety			
		F (%)	Mean & SD	f (%)	Mean & SD		
Exposed to COVID-19	No	399	1.50± 0.50	269	1.60±0.49	2.19	0.00
	Yes	89		87			
Diagnosed with COVID-19	No	472	1.60±0.54	340	1.50±0.49	-0.34	0.48
	Yes	16		10			
Willingness	No	447	1.60±0.48	290	1.38±0.49	-1.41	0.00
	Yes	41		66			
Knowledge	No	218	1.55±0.49	140	1.60±0.48	1.55	0.00
	Yes	270		216			

Variables		Willingness for COVID-19 vaccination				Independent t value	P value
		Willingness		Without willingness			
		F (%)	Mean & SD	F (%)	Mean & SD		
Exposed to COVID-19	No	592	1.18+0.32	76	1.82+0.38	2.21	.00
	Yes	145		31			
Diagnosed with COVID-19	No	722	1.88+0.32	90	1.60+0.54	4.87	.00
	Yes	15		11			
Anxiety	No	290	1.80+0.39	66	1.91+0.28	-4.41	.67
	Yes	447		41			
Knowledge	No	317	1.88+0.32	41	1.86+0.34	0.91	.02
	Yes	420		66			

Table-4: Multiple logistic regression analysis of anxiety factors associated with demographic variable, knowledge, willingness, exposed to COVID-19 and diagnosed with COVID-19.

Anxiety	B	S.E.	Sig.	Odd	CI (95%)	
					Lower	Upper
Knowledge	-.194	.149	.193	.824	.616	1.103
Willingness	.883	.225	.000	2.419	1.555	3.763
Exposed to COVID-19	-.379	.178	.034	.685	.483	.971
Diagnosed with COVID-19	.502	.444	.258	1.652	.692	3.941
Gender Female	-.031	.157	.845	.970	.714	1.318
Age	-.044	.126	.727	.957	.748	1.224
Education Post graduation	-.042	.118	.721	.959	.761	1.208
Occupation Student	-.266	.077	.001	.766	.659	.890
Income Low income	-.206	.078	.009	.814	.698	.949

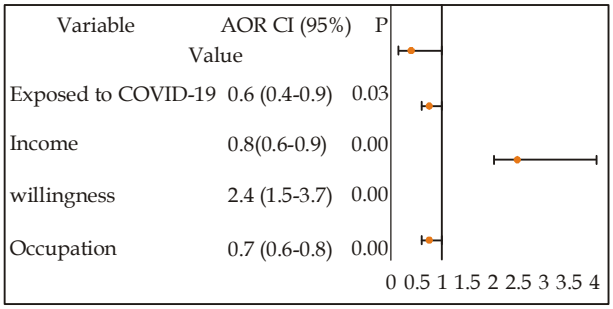

Fig. 1: Prediction of anxiety and other variables among frontline workers.

Of the 884 responses received from the participants, 844 respondents were included after removing incomplete information and duplicates. Majority of the participants 593 (70.2%) aged between 16-30 years, 547 participants (64.8%) were female, 507 participants (60%) had completed secondary education, 682 participants (80.7%) belonged to Hindu religion, 424 (50.2%) participants were students, and 405 (48%) participants had an income of less than 10,000 per

month. An association was found between anxiety with age, education, income, & occupation. Table-1

The uni-variate variables viz. exposed to COVID-19, diagnosed with COVID-19, knowledge, anxiety and willingness were summarized in form of frequency, percentage, mean, and standard deviation. Table-2

Independent paired t-test was used to compare between anxiety with exposed to COVID-19, diagnosed with COVID-19, willingness, and knowledge. Willingness to COVID-19 vaccination is summarized. Table-3 Except for those diagnosed with COVID-19, other parameters were found significant between anxiety. Similarly on comparison between willingness and not willingness with independent parameter, except for anxiety, all other variables were found significant (P=0.05). Table-3

Multiple logistic regression model

Multiple logistic regression model was used to assess the potential effects between the anxiety and other independent variables. Table-4 Anxiety was found potentially significant with independent variables. Higher anxiety i.e. 0.6 times higher anxiety was found among those exposed to COVID-19, 2.2 times higher anxiety found among those willing to vaccinate, 0.7 times higher anxiety found among those with income less than 10,000, and 0.8 times higher anxiety among those who were student by occupation ($p<0.05$). Figure-1

Discussion

Though people are excited about the early arrival of a potential vaccine to an ongoing pandemic, they are equally worried about the swift production of a vaccine. COVID-19 vaccine has been invented in a record time of a mere one year, from the day coronavirus was reported. The last time a vaccine was invented with such a pace was the Mumps vaccine (4 years); all credit to the sophisticated technology and global co-ordination [2].

Our study result revealed that 668 (79.1%) of participants were exposed to the COVID-19 pandemic. 812 (96.9%) participants diagnosed with COVID-19. About 486 (57.4%) had poor knowledge and 488 (57.8%) of participants were anxious about the COVID-19 vaccination, and 737 (87.3%) participants were ready for COVID-19 vaccination. Compared to the previous vaccine status, the majority of the people are willing to take the COVID-19 vaccine. In a systematic review carried out, acceptance rates of vaccine were evaluated from 33 countries[13]. Low rate of acceptance were reported from Middle-East, Russia, Africa, and several European countries. While, acceptance rate of 78.1% was found among Israel healthcare workers. Among the public, the same study reported an acceptance rate = 70%.(14) Approximately 87% of participants believed that the Indian COVID-19 vaccine is safe[15, 16].

This is a first study illustrating prediction of knowledge, anxiety, and willingness on COVID-19 vaccine. Celebrates and eminent people insists to take COVID-19 vaccine in public places to motivate common people. However, proper counseling would be required before initiating mass COVID-19 vaccination in a country like India.[17]

Willingness for taking the COVID-19 vaccine is an individual perception. Our study revealed that approximately 87% of participants were ready for the COVID-19 vaccination. Of 71.5% of participants acceptance of COVID-19 vaccine, the range vaccine varies from China and Russia 90% and 55% respectively. However, people are higher trust on government trusts were more likely accept the vaccine. Similar study was reported from Kuwait, about 53.1% participants were willing to take COVID-19 vaccine once its available from approved agencies.[18,19,20] There were 0.6 times higher anxiety among those exposed to COVID-19, 2.2 times higher anxiety among those willing to be vaccinated, 0.7 times higher anxiety among those with an income less than 10,000, and 0.8 times higher anxiety among those who were student by occupation; p=0.05. On the other hand, knowledge is an important factor that influences behavior of an individual. Our study revealed that approximately 58% of participants were knowledgeable about COVID-19 vaccine.[21, 22]

Conclusion

With the initial attempts towards developing COVID vaccine, it was pre-decided that the health-care workers would be the first to receive vaccination, as this would save most of the lives and would significantly reduce the strain on the health-care system. Though the vaccine has been fast-tracked, the aspects involving safety hasn't been compromised. Being stressed can weaken the immune system, which could affect the ways in which body would respond to virus. It's important to find ways to keep the stress at maynot only for emotional wellbeing, but also to make sure to get the full benefits of the vaccine.

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Effect of Facilitated Tucking Position on Pain Among Infants Receiving Intramuscular Immunization

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Abstract

A quasi experimental study to assess the effect of facilitated tucking position on pain among infants receiving intramuscular immunization at selected hospital, Thrissur. The objective of the study was to assess the pain score among infants receiving intramuscular immunization in comparison and experimental group, evaluate the effect of facilitated tucking position on pain score among infants receiving intramuscular immunization in experimental group and associate the pain score among infants receiving intramuscular immunization with their selected demographic variables. The conceptual framework utilized in this study was kolkaba's theory of comfort. Nonprobability purposive sampling technique was used to select the samples. Post-test only design was adopted to assess the effect of facilitated tucking position on pain score among 60 infants (30 in experimental and 30 in comparison group) undergoing intramuscular immunization who fulfilled the inclusion and exclusion criteria at Government General Hospital, Thrissur. The tool consists of semi structured questionnaire to assess the demographic variables of infants, includes age, gender, weight, height and time of last feed. Face Leg Anger Cry and Consolability (FLACC) Scale was used to assess the pain score of infants in experimental and comparison group. Reliability and validity of the tool was established. The pilot study was done for 6 subjects and found to be feasible. The main study was conducted from 2nd February to 3rd March 2019. Facilitated tucking was performed on the infants during intramuscular immunization and the pain score was assessed after the procedure and interpreted using FLACC Scale. The study findings revealed that Comparison of pain score in both groups that the calculated 't' value was 7.22, where the table value was 2.390 at 0.001 level of significance. Thus, it was concluded that the facilitated tucking was effective in reducing pain during intramuscular immunization. There was no xii statistically significant association between the pain score among infants receiving intramuscular immunization with their selected demographic variables. Nurses can practice facilitated tucking as a part of routine nursing care of infants during painful procedures.

Keywords: Facilitated Tucking Position; Pain Score; Infants; FLACC scale.

Introduction

Infancy is a period of rapid remarkable changes in growth and development as compared with any other period throughout life. Body and organ systems although not much fully mature, functions differently than they did at birth. Infants undergo multitude of diagnostic and therapeutic procedures that are painful but medically necessary to their care such as

heel prick, venipuncture, and vaccination etc. According to WHO universal immunization coverage survey, 2016, about 86% of infants' worldwide (116.5 million infants) received 3 doses of diphtheria-tetanus pertussis (DTP3) vaccine, protecting them against infectious diseases that can cause serious illness and disability or be fatal.[2] In India, the immunization rate is 58.5% in rural and 67.4% in urban respectively[3]. In Kerala the immunization rate is 81.5% in rural area and 81.7% in urban area. Routine immunization injections are the most aversive medical procedure for healthy infants and children. Although immunization injections represent a relatively brief exposure to acute pain, studies demonstrated that infant exhibit significant response during these injections. Every child has his/her own perception of pain, which involves not only the actual tissue injury but also the child's understanding, emotions and past history of pain

The International Evidenced Based Group for neonatal pain and the American Academy of Pediatrics (2010) recommended that all neonatal units must develop strategies to assess the painful responses during procedures, minimize the number of minor painful procedure and to provide non-pharmacological pain relief for infants during painful procedure. The investigator during his clinical practice, witnessed that the various behavioral response of the infants during painful procedures. Usually, painful expressions of the fragile infants are not given much clinical importance. Hence the investigator felt the need of simple, cost effective, non-pharmacological nursing intervention to reduce pain.

Statement of the problem

A quasi-experimental study to assess the effect of facilitated tucking position on pain among infants receiving intramuscular immunization at selected hospital, Thrissur. Objectives

- Assess the pain score among infants receiving intramuscular immunization in comparison and experimental group.
- Evaluate the effect of facilitated tucking position on pain score among infants receiving intramuscular immunization in experimental group.
- Associate the pain score among infants receiving intramuscular immunization with their selected demographic variables.

Research methodology

Research approach: Quantitative Approach
Research design: Quasi Experimental post-test only comparison group design.

Variables

- Independent variable: Facilitated tucking position
- Dependent variable: Pain in infants receiving IM immunization.

Setting: Government General hospital, Thrissur

Population: Infants receiving immunization

Sample: Infant in the age group of 2-4 months receiving intramuscular immunization Sampling technique: purposive sampling

Sample size: A total number of 60 infants will be selected, out of 30 in the experimental and 30 in the comparison group

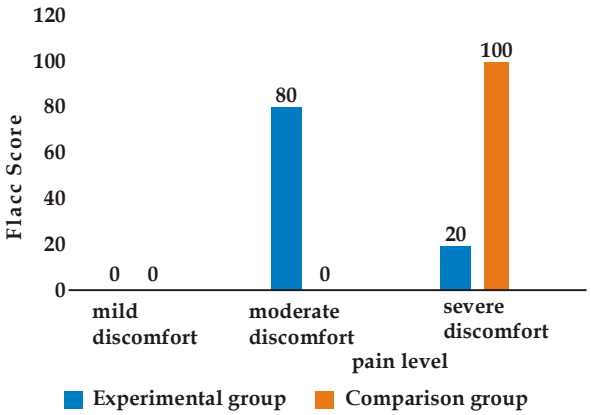
Tool and technique

Tool-1: A structured questionnaire of demographic data of infant, which is assessed through observation and interview.

Tool-2: FLACC scale: The Face, Legs, Activity, Cry, Consolability scale or FLACC

Results

This experiment was conducted to assess the effect of facilitated tucking position on pain among infants receiving intramuscular immunization. The experiment was conducted among 60 infants who received intramuscular immunization at Government General hospital, Thrissur. The collected data were analyzed by both descriptive and inferential statistics according to the objectives of the experiment.



Assessment and comparison of post -test level of pain among infants undergoing intramuscular immunization between the experimental and comparison group.

frequency and percentage distribution of subjects by pain score shows that most infants 50% perceive moderate to severe pain in experimental and comparison group.

Comparison of post-test level of pain between experimental and comparison group.

Group	Mean	Standard deviation	Effect Size	Paired 't' test score	Table value	Inference
Experimental	5.97	1.474	2.4	7.227	2.326*	Significant
Control	8.37	1.066				

*0.001 level of significance

The above table shows that mean pain score of post-test level of pain in the infants who underwent intramuscular immunization with facilitated tucking was significantly less than mean pain score of post-test level of pain in the infants who underwent intramuscular immunization with the hospital routine (verbal pampering).

The calculated paired 't' test value is 7.227 which was found to be highly statistically significant at $p<0.001$ level which indicates that the infants who were given the nursing intervention facilitated tucking was comfortable, more secure with controlled response and had reduced pain during intramuscular immunization.

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Effect of Buteyko Breathing Technique on Asthma Control Among Children

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Abstract

A quasi experimental study to assess the effect of Buteyko breathing technique on asthma control among children at selected hospital, Thrissur. The objective of the study was to assess the score of Asthma control among children in experimental and comparison group, evaluate the effect of Buteyko breathing technique on asthma control in experimental group and associate the score of asthma control among children with their selected socio demographic variable. Roy's adaptation model was used as the conceptual framework. Pre test post test design was adapted to assess the effect of Buteyko breathing technique on asthma control and purposive sampling technique was used to select 60 children in the age group of 4-11 years (30 in experimental and 30 in comparison group) who fulfilled the inclusion and exclusion criteria from out-patient and in-patient department of Government General Hospital, Thrissur. The tool consists of semi structured questionnaire to assess the demographic variables of children and their parents. Childhood asthma control test was used as a tool to evaluate the effectiveness of Buteyko breathing technique in pre and post test level of asthma control. Reliability and validity of the tool was established. The pilot study was done for 6 subjects and found to be feasible. The main study was conducted from 2nd February to 3rdMarch 2019. The comparative study findings revealed that the calculated 't' value of asthma control in both group was 7.22, whereas the table value t was 2.390 at 0.001 level of significance. The investigator analyzed the association of selected demographic variables with pre test score of asthma control. Among 12 selected demographic variables socioeconomic status of the child had an association with pre test score.

Keywords: Buteyko breathing technique; Asthma control; Children; Childhood asthma control test.

Introduction

Asthma is a common chronic inflammatory disease of the airway that affects people of all age groups and it imposes a substantial burden on children ,their families, and the community. The increasing prevalence of asthma is a global phenomenon. Asthma causes limitations in the daily activities, lack of school and work days, lung function impairment, reduced quality of life, and an adverse socioeconomic burden.There is no cure for asthma but the symptoms can be prevented by avoiding triggers, such as allergens and irritants. Non-pharmacological approaches are important aspects of asthma management. These approaches are used in combination with medications. Buteyko Breathing Technique (BBT) is a form of complimentary or alternative physical therapy containing a set of simple breathing exercises that proposes chronic breathing

retraining as a treatment for asthma as well as for other conditions. It is a simple set of breathing exercises that helps in reversing hyperventilation and reducing symptoms in asthma, and other breathing disorder that focuses on nasal breathing, breath holding and relaxation[8]. Based on the above facts the investigator has taken an attempt to study the effectiveness of Buteyko breathing technique as a simple, easy way on reduction of asthma symptoms among asthmatic school children.

Statement of the problem

A quasi experimental study to assess the effect of Buteyko breathing technique on asthma control among children in selected hospital, Thrissur.

Objectives

- Assess the score of Asthma control among children in comparison and experimental group.
- Evaluate the effect of Buteyko breathing technique on asthma control in experimental group.
- Associate the score of asthma control among children with their selected socio demographic variable.

Research Methodology

- Research Approach: Quantitative approach.
- Research Design: Quasi experimental pretest - posttest control group design.
- Variables: Independent variable: Buteyko breathing Technique.
- Dependent variable: Asthma control among children.
- Setting: Government General hospital, Thrissur
- Population Target population: Children diagnosed with asthma.
- Accessible population: Children attending OP and IP department of selected hospital with asthma.
- Sample: Children of both gender and belongs to the age group of 4 to 11 years with asthma
- Sampling Technique: Purposive sampling
- Sample Size: A total of 60 children will be selected out of which 30 in experimental group and 30 in the comparison group.

Tool/Instruments

Childhood Asthma Control Test was used as a valid tool to collect data for this study.

The tool constructed for the study has two parts

Section A: Assessment of demographic Variables.

***Tool* 1** is a structured questionnaire for child and it consist of age, sex, weight, area of residence, duration of illness, recurrence and family history of asthma.

***Tool* 2** is a structured questionnaire for the parent and it assessed the age, education, occupation and socio economic status of the parent.

Section B: Childhood Asthma Control Test

The test helps quickly to assess a child's level of asthma control over 4 weeks just prior to the test and assigns a numerical score. The five questions that form the test are simple and check for the frequency and severity of symptoms, their impact on daily life and medication use. Total score is 27.

Intervention: Video assisted teaching and demonstration were provided to the child and the parent in the experimental group on Buteyko Breathing technique. They have instructed to practice the techniques for 4 Weeks twice a day, 12-15 minutes at morning and evening. The group recieved a pamphlet on steps of Buteyko Breathing technique and an activity log as a guide to practice.

Technique: Personal and telephonic interview.

Results

In this study, in regard to the age of the children, 14(46.67%) of the subjects in the experimental group belonged to 4 -6 years of age, 9(30%) children were in the age group of 6-8 years of age. Children of 8-11 years of age were 7(23.3%). In comparison group 15(50%) of the children belonged to 6-8 years of age and 12(40%) of them were in 4 -6 years of age and only 3 (10%) of the subjects were having 8-11 years of age.

The study consists of more male children, than female children, experimental group 17(56.67%) and in the comparison group 16(53.3%) were males. In reference to body weight 28(93.30%) of each group were appropriate for the age in the experimental group and 26(86.67%) in the comparison group. In experimental group 2(6.67%), 3(10%) in the comparison group were malnourished and only 1(3.33%) subject in the comparison group was found to be obese.

In both experimental and comparison groups 24(80%) of the subjects were living in the urban area and the rest of them were from the rural area. In experimental group, 14(46.67%) of the subjects were having a one-year duration of illness, 12(40%) were having less than one year of illness and only 4(13.3%) were suffering from asthma for more than three years. In the comparison group, both the categories 8(26.67%) were having less than one-year illness duration and more than three years of illness duration.

In the experimental and comparison group 20(66.67%) were not taking any medication for asthma and 7(23.3%) of subjects in the experimental group and 10(33.3%) in the comparison group were using inhalers. Only 3(10%) of the experimental group were taking bronchodilators too. Considering the recurrence of asthma, 23(76.6%) of the subjects in the experimental and comparison group were having twice the recurrence and the rest of them were having more than thrice of recurrence in a year. The study includes 24 (80%) in the experimental group were having a family history of asthma, and it is almost the same in the comparison group that is 26 (86.67%).

A paired t-test was used to compare the post-test score of asthma control in the experimental and comparison group. The pre-test score was 15.72± 3.087 and the post-test score was 19.15± 1.538. This showed that the mean score of the post-test in the experimental group was higher than the pre-test score. The calculated t' value was 10.726 where the table value was 3.2342 at 0.01 level of significance. As the obtained value was higher than the table value, it indicates that there is a significant difference in the control of asthma among children in the experimental and comparison group. So that there is a significant difference in the score of Asthma control between experimental and comparison group after the intervention. Hence the research hypothesis stated "there is a significant difference in the score of asthma control between experimental and comparison group after intervention" was accepted.

The investigator analyzed the association of control of asthma with selected demographic variables using the Chi-square test. Results revealed that out of 12 demographic variables, socio economic status had an association with the control of pre-test score of asthma. The number of subjects who were suffering with uncontrolled asthma was higher in lower socio economic class that is 40(66.67%) compared with middle class of 16 (26.67%). Thus there was a significant association between socio-economic status with the pre-test score of asthma.

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Effectiveness of Magnesium Sulphate Fomentation vs Potato Juice Application on Phlebitis among Sick Children Between 1-3 years Receiving Parenteral Medicine in the Pediatric Ward at Burdwan Medical College and Hospital, Burdwan, West Bengal

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Abstract

***Context*:** The Protease inhibitors in Potato juice have anti-inflammatory effect which are help to reduce the pathological changes of tissue caused by phlebitis in sick children.

***Aims*:** The study aims to compare the effectiveness of $MgSO_4$ fomentation vs potato juice application on phlebitis.

***Setting and Design*:** Paediatric Medicine ward in Burdwan Medical College and Hospital, Burdwan. Quasi-experimental equivalent time series design was used for the study.

***Material and Methods*:** Non –probability purposive sampling was used the sample comprised of 50 sick children 1-3 years of age were getting intravenous medication and develope phlebitis. Pretested reliable tool had introduced. Data were collected through interview schedule, observation and assessment method.

Statistical analysis used: Collected data were tabulated, analyzed and statistically calculated by descriptive and inferential statistics .Inferential statistics had used both dependent and independent t test by using ANOVA.

Results: In total. Out of 50 children, the incidence of grade II Phlebitis was 40% and grade III Phlebitis was 60%. The mean reduction score was less in experimental group II was treated with potatao juice (.22,0) than experimental group I treated with MgSO4 fomentation (1.3 and 0.04) in subsequent 12^{th}, 24^{th}, 36^{th}, 48^{th} and 60^{th} hour with mean difference 1.8 and 0.04, which statistically significant at .05 level with df 48 as seen by t value 2.01.

Conclusions: The study result shows that potato juice was better than 50% magnesium sulphate fomentation in reduction of phlebitis in less time and also effective for tissue regeneration.

Keywords: Effectiveness; Sick children; Magnesium Sulphate Formentation; Potato juice application; Phlebitis; Pain.

Key messages: In nursing practice, potato juice is very cost effective and needed less time in reduction of phlebitis. Health education can be given on the use of potato juice an ideal first aid for pain, swelling, redness and burn. On the basis of the findings, the researcher strongly recommends that generalised the study on adult and large population.

Introduction

Phlebitis or inflammation of the vessel wall, may also develop in children who require intravenous therapy. according to Lamagna and Macphee (2004)[1]. Protease inhibitors from potato juice have an anti inflammatory effect.[14]

As there were no Indian study, so researcher felt need to establish the most effective method in treatment of phlebitis among sick children with following aims and objectives, that were -to determine the effect of $MgSO_4$ fomentation, to assess the effectiveness of potato juice application on phlebitis and to compare the effectiveness of $MgSO_4$ fomentation and Potato juice application on phlebitis in sick children along with others objectives.

Objective 2-To assess the effectiveness of Magnesium sulphate fomentation on the phlebitis in sick children.

Hypothesis 1

H_1 There is significant difference in mean phlebitis measurement score after application of magnesium sulphate fomentation is significantly less than that of the mean score before the application at 0.05 level of significance.

HO_1 There is no significant difference in phlebitis measurement score of 12th, 24th, 48th and 72th hour, after magnesium sulphate fomentation as measured by hlebitis measurement chart at 0.05 level of significance.

Objective 3- To assess the effectiveness of potato juice on phlebitis in sick children in term of reduction of sign of phlebitis.

H_2 There is significant difference in mean phlebitis measurement score after the application of potato juice is significantly less than that of the mean score before the application at 0.05 level of significance.

HO_2 There is no significant difference in mean phlebitis measurement score after the application of potato juice is significantly less than that of the mean score before the application at 0.05 level of significance

Objective 4 - To compare the effectiveness between Magnesium sulphate fomentation and Potato juice application on phlebitis in sick children.

Hypothesis

H_3 The reduction of phlebitis measurement score is significantly higher among children receiving potato juice than receiving MgSO4 (at 12th, 24th 36th, 48th and 60th hour) at .05 level of significance.

$H0_3$ The reduction of phlebitis measurement score is not significantly higher among children receiving potato juice than those receiving $MgSO_4$ at .05 level of significance.

Methods and Materials

Study site was Department of Pediatric Medicine, Burdwan Medical College and Hospital, Burdwan, West Bengal.

Study duration was one year. Ethical clearance obtained. Study sample were 50 cases fulfilling the following inclusion criteria with children in the age group of 1-3 years having phlebitis due to parenteral medication Experimental group I-magnesium sulphate fomentation for 25 sample Experimental Group II-potato juice application for 25 sample with phlebitis. All the tools had pretested and introduced after made their reliability. Standardized phlebitis measurement chart had used.

Data collection procedure

The final study was conducted at Burdwan Medical College and Hospital in Pediatric Medicine ward. The data collection was done from November 1st week to 4th week. Ethical permission was taken from Ethical Committee of Burdwan Medical College and Hospital. Administrative permission was sought from DDHS Nursing. Written permission taken from MSVP, NS and HOD of Pediatric Medicine Ward BMCH. Informed consent will be taken from the mothers of those children. Self introduction given to the mother of the subject. Purpose of the study was stated and explanation of the procedure was given , thus a rapport was established. Written consent was taken from subject. The sample was selected room wise and this was based on selection criteria. In this study, the selection of sample was done by purposive sampling technique. During data collection period the sick children age between 1-3 years with phlebitis were selected purposively and then randomly assigned to experimental group I and experimental group II by tossing a coin. Head of the coin was indicated as experimental group I and tail of the coin was indicated as experimental group II . In this way 25 sick childen in the experimental group I were selected and coded as M_1, M_2, M_{25} and another 25 sick children are experimental group P_1, P_2, P_{25} respectively on their bed head ticket. M for magnesium sulphate and P for potato juice application. Administer phlebitis grading scale in single time for assessment of severity. Phlebitis score was separately assessed by phlebitis measurement chart then administer the 50% magnesium sulphate fomentation by 5/5''gauze piece for 15 minutes

duration and temperature between 100°F to 103°F. Potato juice prepared by grating and squeezing the juice, and soaked 5/5''gauze piece with extract juice apply on phlebitis. It was done twice a day in 3 consecutive day. After each application of magnesium sulphate fomentation and potato juice application the phlebitis score was measured at 12th hour by phlebitis measurement chart.

Results

It has cleared from table 7 that the mean reduction score is less in experimental group II was treated with potato juice (.22, 0) than experimental group I treated with magnesium sulphate fomentation (1.3 and 0.04) in subsequent 12th, 24th, 36th, 48th and 60th hour with mean difference 1.8 and 0.04, which statistically significant at .05 level with df 48 as seen by t value 2.01, and that means the potato juice application on reduction of phlebitis is more effective than magnesium sulphate fomentation.

Tables

Table 2: Sex wise percentage distribution of the children with phlebitis according to sex

n= 50(25+25)

Variable	Experimental-I		Experimental-II		Total
	f	%	f	%	f
Male	12	48	17	68	29(58)
Female	13	52	8	32	21(42)

Data depicted in table 2 that in experimental group I maximum 13 (52%)female children receiving magnesium sulphate fomentation and maximum male children 17 (68%) was in experimental group II receiving potato juice application. Over all male children are more (58%) than that of female children(42%).

Table 3: Percentage distribution of causes of hospitalization among sick children with phlebitis In experimental I and II group.

n= 50(25+25)

Variable Cause of the disease	Experimental I f	Percentage %	Experimental II f	Percentage %	Total (%) f
W.A.L.R.T.I	5	20	5	20	10(20)
Diarrhoea	1	4	0	0	1(2)
Heart disease	1	4	1	4	2(4)
Fever	1	4	3	12	4(8)
Rh. fever	1	4	-	-	1(2)
A.G.E	4	16	6	24	10(20)
Bronchopneumonia	7	28	7	28	14(28)
Seizure disorder	4	16	3	12	7(14)
Electric shock	1	4	-	-	1(2)

Table 3 depicted that in both experimental group I and II most of the children suffer from Bronchopneumonia(28%). The next common condition was W.A.L.R.T.I (wheeze associated lower respiratory tract infection) 20% in both groups. AGE (acute gastroenteritis) was(24%) present in group II and 16%in group I. Seizure disorder was observed 16% in experimental I 12% in experimental group II. In the total group bronchopneumonia was most common in 28% of children. There was no subject with electric shock, Rheumatic fever in experimental group.

Table 4: Mean median SDE of mean deviation, 't' value of phlebitis score with 1st and 12th, 36th, 60th hour observation for Ex I.

n=25

Observation	Mean	M_D	SD_D	SE_{MD}	't'
1st hr observation	3.88				
		.72	1.07	0.15	4.8*
12th hr observation	3.16				
1st hr observation	3.88				
		1.86	1.97	0.27	6.81**
36th hr observation	2.02				
1st hr observation	3.88				
		3.42	2.48	0.35	13.37**
60th hr observation	0.46				

df(24)= 2.06 p *< 0.05 , 2.8p*< 0.01

Data presented in table 5 show that mean difference of phlebitis score in experimental group I between 1st & 12th hour after application of $MgSO_4$ is .72. The obtained mean difference in reduction of phlebitis score between 1st with 12th hour was found to be statistically significant as evident from 't' value of 2.8 at 0.01 level of significance. The other mean difference of reduction of phlebitis score in following 36th, and 60th hour of observation after application of treatment, are 1.86, 3.42. The obtained mean difference in phlebitis reduction score in subsequent hour (1st, 36th, 60th) after application of treatment, was also found to be statiscally significant as evident from 't' value of 4.8, 6.81 and 13.37 for df (24) at 0.05 level. Therefore, it can be concluded that obtained mean differences between 1st with subsequent 12th, 36th, and 60th hour of observations in experimental group I are true differences not by chance.

That means null hypothesis HO_1 is rejected and research hypothesis H_1 is accepted. This indicates that the magnesium sulphate fomentation was effective in reduction of phlebitis for 12th hour after application, among sick children between 1-3 years getting intravenous medication.

Table 6: Mean median SDE of mean deviation,'t' value of phlebitis score with 1st and 12th, 36th, 60th hour observation for Ex II.

n=25

Observation	Mean	M_D	SD_D	SE_{MD}	't'
1st hour	4.2				
		1.42	1.34	0.18	7.8 **
12th hour	2.78				
1st hour	4.2				
		3.26	2.34	0.33	9.81**
36th hour	.94				
1st hour	4.2				
		4.2	2.76	0.39	10.76**
60th hour	0				

df(24)= 2.06 p *< 0.05 and 2.8p *<0.01

Data depicted in table 6 show that mean difference of phlebitis score in experimental group II between 1st and 12th, 36th, and 60th hour. Observation after application of treatment the obtained mean difference 1.42 in reduction of phlebitis score between 1st with 12th hour was found to be statistically significant as evident from 't' value of 7.8 at 0.1 level of significance. The other mean difference of reduction of phlebitis score in following 36th, and 60th hour after application of treatment, are 3.26 and 4.2 with mean phlebitis score was .94 and 0. The obtained mean difference in reduction of phlebitis score in 36th, and 60th after application of treatment, was also found to be statically significant as evident from 't' value of 9.81 and 10.76 for df (24) at 0.01 level. Therefore it can be concluded that obtained mean difference between 1st and 12th, 36th and 60th hour of observations in experimental group II are true difference not by chance. That means null hypothesis HO_2 is rejected and research hypothesis H_2 is accepted.

Table 7: Mean, mean difference, SDE of mean difference, 't' value of comparisons between effectiveness of MgSO4 compress and potato juice application with reduction of phlebitis score in 1st, 12th, 24th and 36th hour of observation.

n=50

	Mean	M_D	S_D	SE_{MD}	't'
1st hour EX I	3.88				
		-0.32	4.49	.53	.63
EX-II	4.22				
12th hour EX-I	3.16				
		0.38	1.8	0.2	0.76
EX-II	2.78				
24th hour EX-I	2.26				
		0. 32	2.97	0.23	3.21*
EX-II	1.94				
36th hour EX-I	2.02				
		1.08	2.09	0.58	1.83
EX-II	.94				

df (48)=2.01 p*< 0.05

Data depicted in the table 7 show that t test computed between means of phlebitis score on the 1st hour shows that value (t48= .60) is not statistically significant at .05 level. In the 1st observation mean phlebitis score is apparently more in Experimental group II (4.22) than the Experimental group I(3.88). In subsequent evaluation mean phlebitis is apparently more in Experimental group I is higher(3.16, 2.26, 2.02) in 12th to 36th hour of observation than experimental group II (2.26, 1.94, 0.94) with a mean difference 0.38, 0.32, 1.08. The t value computed between phlebitis mean score of Experimental group I and II show that t value 3.21 between on 24th hour, is significant when as t values of 12th hour (t48= 0.76)and 36th hour (t48= 1.83) not significant at .05 level.

Table- 8 Mean, mean difference, SDE of mean difference, 't' value of comparisons between effectiveness of $MgSO_4$ compress and potato juice application with reduction of phlebitis score in 48th with 60th hour of observation.

n=50

		Mean	M_D	S_D	SE_{MD}	t
48th hour	EX I	1.3				
			1.08	1.70	.48	2.25*
	EX II	.22				
60th hour	EX I	0.04				
			0.04	.59	0.16	104.5**
	EX II	0				

df (48)=2.01 p*< 0.05

Data depicted in table 8 that the mean reduction score is more less in experimental group II (.22, 0)than that of experimental group I(1.3 and0.04) in subsequent 48th and 60th hour with mean difference 1.8 and 0.04, which statistically significant at .05 level with df 48 as seen by t value is 2.01.

Thus it can be concluded that obtained mean difference between 24th, 48th, and 60th hour of observations in experimental group I and II is true difference not by chance.

That means null hypothesis is rejected and research hypothesis is accepted. The potato juice application on reduction of phlebitis is more effective than magnesium sulphate fomentation.

Summary

This chapter has dealt with analysis and interpretation of the data collected from 50 sick children with phlebitis by applying both descriptive and inferential statistics. The statistical test employed were frequency and percentage distribution, dependent and independent t test with mean, M_D, SE_{MD}, S_D and 't'test.

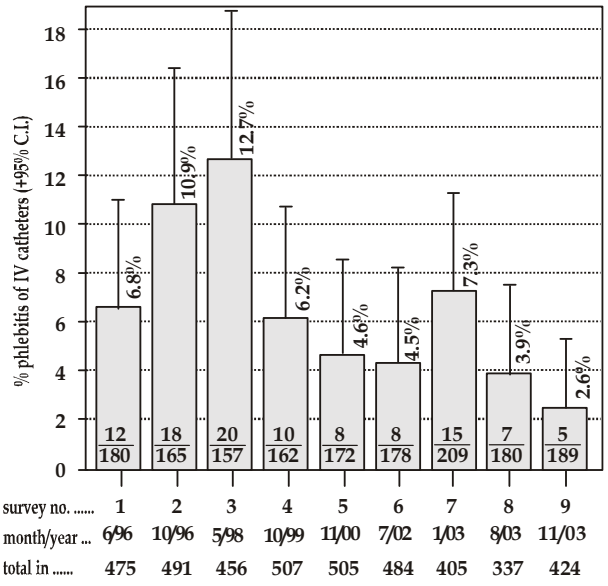

Fig. 1: Overview of all 9 point-prevalence, hospital-wide surveys of peripheral intravenous catheter-associated phlebitis. The number above the column indicates the percentage of detected cases of phlebitis. (Infusion nurses society)

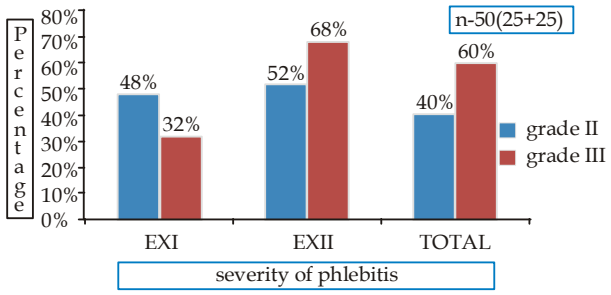

Fig. 2: Bar graph Showing the severity of phlebitis according to grade.

The data depict in fig. 2 that out of 25 children in Experimental group I maximum 52 % had grade III severity and 48%with grade II severity ; whereas out of 25 children in Experimental group II maximum 68% had grade III severity and 32 % have grade II severity of phlebitis. In total group of experimental I and Experimental II majority (60%) had grade III phlebitis.

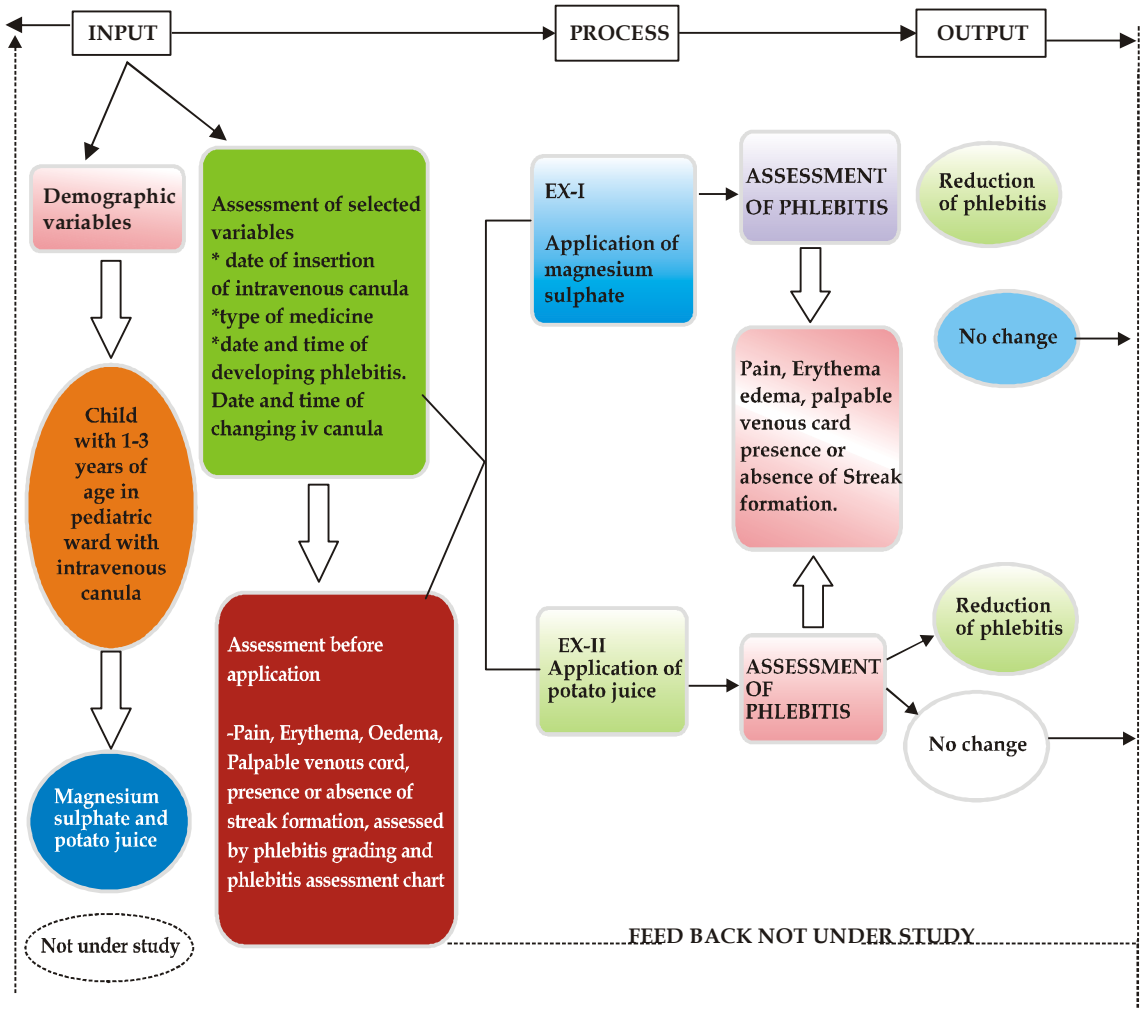

Fig. 3: Schematic representation of Conceptual framework of the study based on Ludwig V on Bertalanffy's general system.

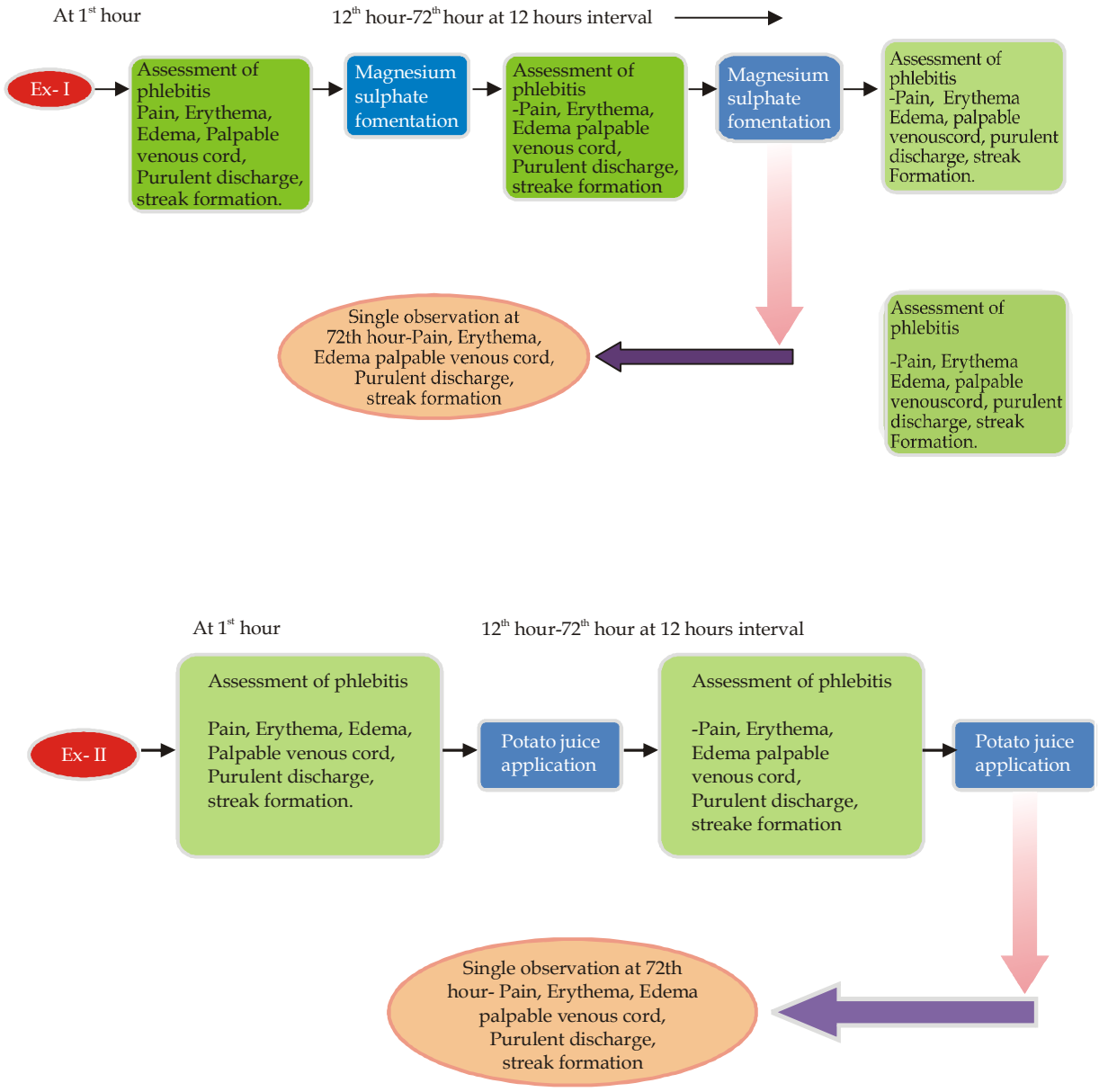

Fig. 4: Schematic representation of research design.

Appendix: 1

Procedure Tray for potato juice application

Fig. 5: Tray for potato juice application.

Fig. 8: Potato Juice.

Fig. 6: Method of squzeeing potato.

Fig. 9: 5''x 5'' Gauze Piece.

- grated potato
- 4 gauze pieces.
- wet sterile swab for clean the area
- kidney dish
- treatment towel as a bed protector.

Appendix: 2

Tray for magnesium sulphate fomentation

Fig. 7: Squeezed Grated Potato.

Fig. 10: 20 Gms Magnesium Sulphate .

Fig. 11: 5x5'' Gauze Pad.

Fig. 12: Lotion thermometer.

Appendix: 3

Photo graph Phlebitis

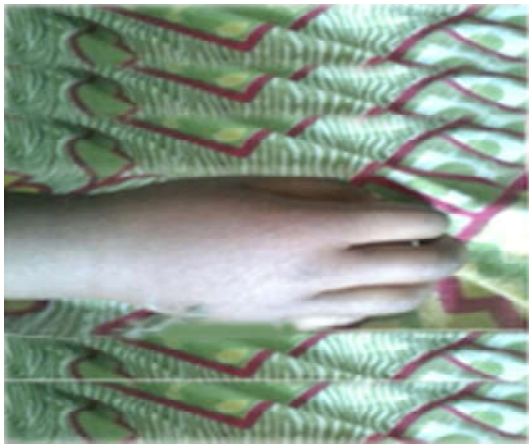

Fig. 13: IV lines with grade II phlebitis.

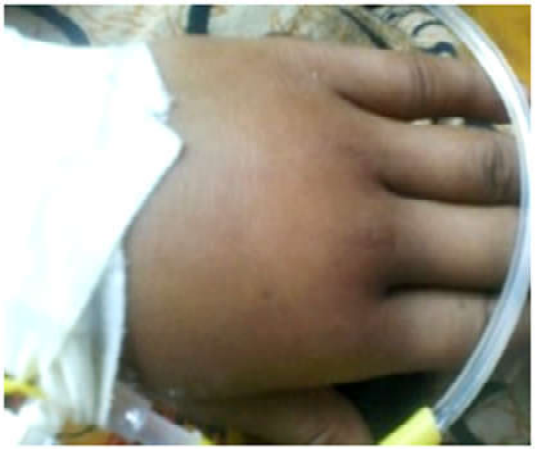

Fig. 14: IV lines with grade III phlebitis.

Appendix: 4

Phlebitis measurement

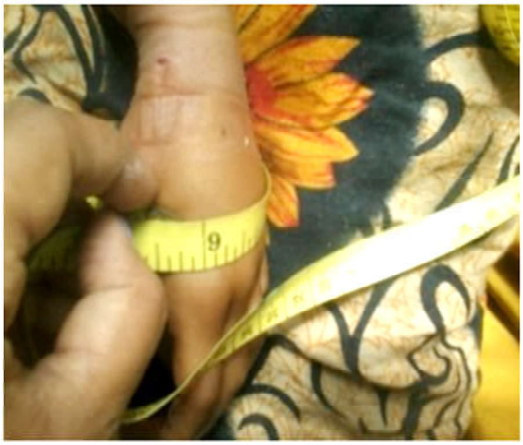

Fig.15: Measurement of Edema, Erythema, palpablecord After Removal of IV Canula.

Discussion

Protease inhibitors from potato juice have an anti inflammatory effect. The protease inhibitors represent 50% of the total soluble proteins in potato juice. The protease inhibitors were classified into seven different families:? potato inhibitor I (PI-1), potato inhibitor II (PI-2), potato cysteine protease inhibitor (PCPI), potato aspartate protease inhibitor (PAPI), potato Kunitz-type protease inhibitor (PKPI), potato carboxypeptidase inhibitor (PCI), and "other serine protease inhibitors". The most abundant families were the PI-2 and PCPI families, representing 22 and 12% of all proteins in potato juice, respectively. Potato protease inhibitors show a broad spectrum of enzyme inhibition. All the families (except PCI) inhibited trypsin and/or chymotrypsin. PI-2 isoforms exhibit 82 and 50% of the total trypsin and chymotrypsin inhibiting activity, respectively[14].

That means the protease inhibitors are anti-inflammatory agent which are reducing the pathological changes of tissue caused by inflammation. Potato juice also improves circulation in general. Potato juice also has a cortico-steroid effect. By this way potato juice reduces peripheral vein inflammation.

Findings related to severity of phlebitis were out of 25 children in Experimental group I 52% had grade III severity of Phlebitis, which was characterized by pain at access site, with erythema and/or edema, palpable venous cord and streak formation and 48% with grade II severity characterized by pain at access site with erythema and/or edema, whereas out of 25 children in Experimental group II 68% had grade III severity.

Findings related to effectiveness of magnesium sulphate fomentation were mean difference of phlebitis score in experimental group I between 1st & 12th, hour after application of $MgSO_4$ are .72, 1.86, 3.42. The obtained mean difference in reduction of phlebitis score between 1st and 12th, 36th, and 60th hour was found to be statistically (4.8, 6.81 and 13.37 for df 49 at 0.05 level.) significant as evident from 't' value of 2.68 at 0.01 level of significance. The obtained mean differences between 1st with subsequent 12th, 36th, and 60th hour of observations in experimental group I are true differences not by chance.

Findings related to effectiveness of potato juice application were observation after application of treatment the obtained mean difference 1.42, 3.26 and 4.2 in reduction of phlebitis score between 1st with 12th, 36th, and 60th hour was found to be statistically significant as evident from 't' value of 7.8, 9.81 and 10.76 for df (49) at 0.1 level of significance. Therefore it can be concluded that obtained mean difference between 1st with 12th, 36th and 60th hour of observations in experimental group II are true difference not by chance.

Findings related to comparison between effectiveness of magnesium sulphate fomentation and potato juice application-The 't' test computed between means of phlebitis score on the 1st hour shows that value (t48= 60) is not statistically significant at .05 level. The t value computed between phlebitis mean score of Experimental group I and II shows that t value 3.21 on 24th hour, is significant where as t values of 12th hour (t48= 0.76) and 36th hour (t48= 1.83) not significant at .05 level.

The mean reduction score is less in experimental group II (.22,0) than that of experimental group I (1.3 and 0.04) in subsequent 48th and 60th hour with mean difference 1.8 and 0.04, which statistically significant at .05 level with df 48 as seen by t value is 2.01

The findings of this present studies reveals that, Potato juice enhances reduction of phlebitis rate which is much faster than that attained by magnesium sulphate wet fomentation. The same findings are reported by Li Sicui, Liao Huijuan (2009)[5]. There was statistical significant difference in terms of recovery rate by Potato external application which was better than 50% magnesium sulphate wet compress to treat patients with drug induced phlebitis.

In this study none of the subjects developed any kind of adverse skin reaction in the potato juice application.

The present study reveals that significant difference was found with the hot wet Magnesium sulphate fomentation in term of reduction of pain edema, erythema, and palpable venous cord, within 72th hour compare to the baseline values. Xulean (2000)[6] reported same different methods in managing tissue damage caused by extravasation. Magnesium sulphate should be chosen according to different characteristics of tissue damage for healing. So it is concluded that magnesium sulphate has a better effect on reducing congestion and edema of local tissue.

In the present study shows that the potato application on phlebitis was effective in relation to faster recovery rate than that of $MgSO_4$ wet fomentation as evidence by mean score of phlebitis by potato juice was 0 at 60th hour and mean score of phlebitis by $MgSO_4$ hot wet fomentation was 0.04. Lagma (2012)[4] Potato external application can effectively prevent venous infusion of amiodarone-induced phlebitis was better in term of feaster recovery than 50% magnesium sulphate solution, wet compress, can effectively reduce vein damage.

In the present study the subject does not develop any kind of skin reaction in potato juice treated group. Tomizawa (2001)[16] wrote in his book "The Way to Healthy Life: wrote that fresh potato juice has no danger of any side effects at all and it enables the patient to restore his physical strength as well as enhance his natural rehabilitative power. The study reveals that there was no side effect occurs in subjects getting potato juice application.

Phlebitis (inflammation of vein) reduction score decreases in term of pain, swelling, edema, erythema, palpable venous cord score faster in subsequent hour by potato juice application than magnesium sulphate wet fomentation. Dr. Lam (2011)[4] reported that anti-inflammatory effect of potato reduces the phlebitis caused by venous inflammation.

The other findings of the study are

Other than erythema, pain, palpable venous cord, the reduction rate of eddema due to phlebitis was occurs more rapidly after application of poatato juice.

Conclusion

There is further need to conduct extensive study for more evidence based information regarding this aspect. The result of this study, tool and methodology may provide guideline for further research.

Acknowledgement

The present study has been concluded and completed under the expert guidance and support of Late Prof. Dr Mrs Aparna Bhaduri, Aparna Nandi and Mrs Susmita Sengupta, Senior Lecturer Govt. College of Nursing, Burdwan.

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Conflict of Interest

This article was the outcome of original research work undertaken and carried out by me, I also declare that there was no financial interest and any conflict of interest.

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Review Article

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Endotracheal Suctioning in Critically Ill Child

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Abstract

Endotracheal suctioning is one of the most common advanced procedure carried out in pediatric intensive care. Despite this, there are not many evidences to support different techniques for endotracheal suctioning in pediatric patients as compared to preterm infants and adults. This paper enlightens different techniques used for endotracheal suctioning in pediatric intensive care unit and also its impact on pediatric patients.

Keywords: Endotracheal Suctioning; Neonates; Children; Pediatric Intensive care units.

Introduction

Endotracheal and tracheostomy tubes are used to maintain airway and facilitate mechanical ventilation. The presence of theses tubes, especially endotracheal tube prevents coughing and effective removal of secretion, therefore periodic suctioning is required. Endotracheal-suctioning (ETS) is one of the most common invasive procedures carried out in patients with mechanical ventilation[1] It is a procedure that aids in removal of pulmonary secretions from the patient's airway who are on mechanical ventilation. This procedure is an essential part of airway hygiene therapy in patients undergoing mechanical ventilation in the intensive care unit (ICU), because these patients often show impaired cough reflex and mucociliary clearance, and increased mucus production.[2]

This paper will enlighten different techniques used for endotracheal suctioning in pediatric intensive care unit and also its impact on pediatric patients.

Impact of Endotracheal Suctioning in Pediatric Patients

Endotracheal suctioning when performed causes changes in lung compliance and airway resistance. It causes stimulation of tracheal wall, thereby producing sympathetic nervous system effects and resulting in increased intracranial pressure.

1. Patients with hypoxemic acute respiratory failure, in particular those with acute lung injury (ALI) and acute respiratory distress syndrome (ARDS) who are ventilated with high fractions of inspired oxygen (FiO_2) and high levels of positive end-expiratory pressure (PEEP), are at greater risk for ES-related complications, especially severe hypoxemia and atelectasis. Different techniques have been developed in order to prevent or decrease ES-induced hypoxemia, such as hyperoxygenation, hyperinflation, and lung recruiting maneuvers.[3, 4]

2. Children with Traumatic Brain Injury and Raised Intracranial Pressure: Fisher et al reported in their study ETS causes increases increased intracranial pressure (ICP) elevation as a result of tracheal stimulation (by the suction catheter) rather than increase in partial pressure of carbon dioxide caused by apnea alone.[5] Yano M et al conducted a study to reduce ICP related to endotracheal suctioning by giving both intravenous and endotracheally administered lidocaine to nine adolescent (and some adult) patients with severe TBI. They found that both methods decreased ICP with suctioning, with endotracheal administration being more effective[6]. It supported Fisher's[6] findings that increase in ICP is primarily due to tracheal stimulation during suctioning. Tume LN also reported in their study that ICP was increased with suctioning both clinically and statistically. The results of the study also showed that majority of children recovered to their baseline ICP within 5 minutes after suctioning, with a median time of 3 minutes (range: 0–90 minutes)[7].
3. Children with Congenital Heart Disease: Reactive pulmonary hypertension is a common problem in the cardiac PICU. Endotracheal suctioning is a known noxious trigger in this group of children, albeit one that is necessary. Hickey has conducted a study to assess the effect of an opiate (fentanyl) on pulmonary vascular response during suctioning. The results showed that there was marked reduction in pulmonary vascular response among children who received opiate before suctioning.[8]
4. Respiratory complications: Hypoxia, pneumothorax, mucosal trauma because of deep ET suctioning in neonates and atelectasis.[9, 10]
5. ET suctioning has been associated with increased nosocomial bacteremia because of entry of pathogens into the airway through suction catheter.[11]
6. Behavioral pain: Pokela ML showed in their study that administration of opioids before ET suctioning significantly reduced the duration of hypoxemia and the level of distress [12].

Evidences in Endotracheal Suctioning Techniques

1. Frequency of suctioning: ES should be performed whenever clinically required, with potential complications associated with the procedure in consideration. In clinical scenerio, suctioning should be performed every 1–2 hours in order to maintain the patency of the artificial airway used[3] while some studies suggested that atleast 12–24 suctioning procedures should be done per day. Cordero et al. conducted a study to compare frequencies of suctioning, every 4 hours and every 8 hours plus as needed, and found that decreasing ES frequency had no clinically important effect on incidence of nosocomial infections, frequency of reintubation, duration of mechanical ventilation, duration of hospitalization, and neonatal mortality, suggesting that a low-frequency suction regimen can be safely implemented.[13] Based on all these data, the updated clinical practice guidelines of the American Association for Respiratory Care recommend ES to be performed only when clinically indicated to maintain the patency of the artificial airway. Other clinical parameters in suctioning should be performed are visible secretions in the endotracheal tubes, increased peak inspiratory pressure during volume-controlled mechanical ventilation or decreased tidal volume during pressure-limited ventilation, marked reduction in oxygen saturation. At present, a sawtooth pattern on the flow-volume loop and/or the presence of coarse crackles over the trachea are likely to be the best parameters to assess the need for suctioning on an individual basis[3].
2. Depth of Suctioning: Deep ES may promote mucosal trauma and airway bleeding, and can also cause major alveolar collapse and hypoxemia. Maggiore SM recommended that suction should be inserted until resistance is met (usually at the carina), followed by withdrawal of the catheter by 1 cm before application of negative pressure.[14]
3. Size of Suction Catheter: The size of suction catheter along with the amount of negative pressure applied and duration of suctioning has impact on severity of potential complications of ES procedure. For this reason, it has been suggested that the diameter of the suction catheter should not exceed one half the inner diameter of the endotracheal and tracheosotmy tubes[15]. Morrow B recommended that the catheter size should be selected in consideration with both ETT size and consistency of secretion,

as small diameter catheters will not effectively clear thick secretions[16].

4. Level of Negative Pressure: The suction pressure should be high enough to remove secretions, but not so high that it can cause mucosal damage or lung volume loss. Evidences are limited regarding the ideal amount of negative pressure to be applied during suctioning. Negative pressures between 100 and 250 cmH_2O have been recommended[3,5]. Young CS suggested that suction pressures may be increased up to 200 mm Hg to aspirate thick secretions[15]. Kohlhauser C used suction pressures between 200 and 300 mm Hg in their neonatal study[17].
5. Duration of Suctioning: Increase in duration of suctioning concurrently increases the amount of negative pressure within a lung and causes variable degree of hypoxia clinically. Presently there is not enough evidences regarding duration of suctioning but some authors recommend between 10 and 15 seconds[17]. Runton recommended from their study that duration of suctioning should be limited to 5 seconds in children [18].
6. Hyperoxygenation: Hyperoxygenation is reuired during suctioning in order to prevent ET suction-induced hypoxia but there are limited evidences that depicts the exact amount and duration of preoxygenation[19]. Evans JC showed in their study that providing 10% fiO_2 above baseline for 2 minutes before suctioning and manually ventilating with 100% O_2 in between suctioning reduced the incidence of hypoxemia, bradycardia, and apnea associated with suctioning[20]. Kerem et al. also concluded based on results of their study that delivering 100% inspired O_2 for 1 min before the procedure reduces the chances of decrease in oxygen saturation during suctioning[21]. Branson et al. suggested that adults and children should receive 100% inspired O_2 for 30 seconds before suctioning[18]. On the contrary, delivering 100% oxygen is associated with absorption atelectasis which may enhance the ES-related alveolar collapse.
7. Use of Saline: Isotonic saline (sodium chloride) is being used from a long time during suctioning in PICU with the impression that the fluid aides in removal of pulmonary secretions by either diluting thick secretions or by eliciting cough reflex. This method was introduced before development of humidifying systems and is still in practice. However, mucus and water when present in large amount do not mix with each other thereby making separate phases even after vigorous shaking. Thus, the use of saline in dilution secretion is still questionable. It may also cause additional dispersion of contaminated adherent material in the lower respiratory tract when used during endotracheal suctioning thereby increasing the risk for nosocomial infection[22]. The use of normal saline is effective only in infants with ETT size 2.5 mm for maintaining artificial airway patency.[23]
8. Open vs Closed-System Suctioning. Suctioning is performed with one of two basic methods. In open suctioning technique, a single use suction catheter of appropriate size is introduced into the open end of endotracheal tube after disconnecting the tube from ventilatory circuit. In closed suctioning technique, also called as in-line suctioning, a multiple use suction catheter wrapped inside a plastic sleeve is inserted through a special diaphragm attached to endotracheal tubes. Closed suctioning should be done in patients with moderate to severe pulmonary insufficiency, those requiring high positive end expiratory pressure and high inspired oxygen (>80%) or in whom airborne transmission is suspected like active pulmonary tuberculosis. It also decreases the risk for aerolization of tracheal secretion during suction induced coughing[24]. Mosca FA et al reported in their study that CSS in neonates led to decrease in degree and duration of desaturation and bradycardia[25]. Choong K suggested that use of CSS may prevent ET suction induced hypoxia and decreases in lung volume in pediatric patients[26]. The major disadvantage of CSS use is ineffective clearance of thick secretions from the airways. Practically, if suction catheter is not removed completely after suctioning then it may cause partial occlusion of endotracheal tube and may further increase airway resistance. Cordero L et al showed in their study that CSS as compared to OES did not affect the rate of bacterial airway colonization, frequency of ET suctioning and reintubation, duration of mechanical ventilation, length of hospitalization, incidence of nosocomial pneumonia or mortality among low birth infants. However, CSS was most preferred by nurses because it decreases their time, improved their effi-

ciency and also was easy to use as compared to OES. The nurses also perceived that it was better tolerated by the patients as compared to OES[27]. Choong et al. found that OES led to increase in loss of total lung volume as compared to CSS in pediatric patients aged 6 days to 13 yrs. It was also found that patient with OES experienced more periods of desaturaton as compared to CSS. Thus authors recommend that CSS is preferable to the open technique, especially in patients requiring high levels of positive end-expiratory pressure, to avoid alveolar derecruitment and hypoxia during ET suctioning.

9. Recruitment Maneuvers: Duff et al conducted a study to assess the safety and efficacy of sustained inflations (SIs) as a lung Recruitment Maneuver (RM) in PICU children the results of the study found a significant sustained decrease in oxygen requirements (by 6.1%) lasting up to 6 hours post-RM; thus, they concluded that RMs are safe and may improve oxygen requirements[27]. With conflicting results regarding the efficacy of RMs and some safety issues raised, this practice cannot be recommended.

Conclusion

Endotracheal suctioning is the most common procedure carried out in pediatric intensive care unit. The above review support different practices carried out for suctioning in children as well as neonates in intensive care units.

Conflict of Interest : No conflict of interest

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Pediatric Delirium: Incidence and Risk Factors

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Abstract

Delirium, a syndrome of acute brain failure caused by medical illness, is becoming increasingly recognized in children. Although research in this field remains limited, early studies indicate that it is common, likely has negative long-term squeal, and is treatable with both non-pharmacologic and pharmacologic approaches. The present study reviews the incidence and risk factors associated with delirium among critically ill children admitted in intensive care unit.

Keywords: Delirium; Incidence; Prevalence; Risk Factors; Intensive Care unit.

Introduction

Critically ill patients admitted to an ICU are always "at risk" for acute brain dysfunction, which may manifest itself as reduced consciousness, coma, or delirium the pathophysiology of acute brain dysfunction can be conceptualized as a complex interplay between disease-related factors (e.g., inflammation, severity of illness), predisposing risk factors (e.g., age, cognitive impairment) and environmental factors (e.g., restraint, noise, sleep deprivation, medication such as benzodiazepines).[1] Both adult ICU and PICU survivors may suffer from the postintensive care syndrome in the year after ICU discharge, with mental health problems such as anxiety, depression, and delusional memories.[2]

According to the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), characteristics of delirium include rapid onset; fluctuating course; and disturbances of attention, memory, thought, perception, and behavior that "do not occur within the context of a severely reduced level of arousal such as coma."[3, 4] While delirium in hospitalized adults, and particularly older adults, is well documented, affecting between 42% and 80% of this population,[5] its occurrence among hospitalized children is less clear.

The objective of the study is to review incidence and various risk of delirium occurring in patients admitted in PICU.

Incidence and Risk Factors

- Gabrielle S et al conducted a study to assess prevalence and risk factors for delirium in critically ill children. The study reported that prevalence rate was 21% and risk factors were presence of developmental delay, need for mechanical ventilation and children aged between 2-5 years.[6]
- Flores A conducted a study to assess the incidence and risk factors associated with delirium in pediatric intensive care unit (PICU). The incidence reported was 7.7 % with duration of 2 days. The risk factors identified in critically

ill children were age less than 2 years, female children, children on mechanical ventilation, use of antiemetics and anticholinergics agents; and changes in serum sodium and potassium level.[7]

- Castano A conducted a study to assess the incidence of delirium in critically ill children between 6 months –5 years and 11 months of age. The study results stated that there was 25.8% of delirium was present among children in PICU. Out of these, 62.5% cases were hypoactive and 37.5 % cases were hyperactive. The presidposing factors were male child; use of benzodiazepines, narcotics and analgesics.[8]
- Kim H conducted a study to assess the factors associated with pediatric delirium in PICU. The study results sated that incidence rate among children in PICU were 42.1%. The risk factors were associated with age group (2-5 years of age), admission type (emergency), use of physical restraints, RASS score (Richmond Agitation Sedation Scale) (score > 0), need for oxygen, use of mechanical ventilator, feeding and presence of familiar objects.[9]
- Giles L conducted a study to assess the prevalence and risk factors associated with delirium in PICU. The study reports that incidence rate was 18% with 49.4% in children aged between 2-5 years of age, 147.1% were males and 43.5% were developmentally delayed. The risk factors were young age, male child, presence of developmental delay, use of mechanical ventilator; and use of benzodiazepines and opioids.[10]
- Traube C conducted a study to determine prevalence of delirium in critically ill children and explore associated risk factors. The prevalence rate was 25% among children in PICU. The factors associated with delirium were reason for ICU admission (highest in children admitted with inflammatory and infectious disease), length of PICU stay (6 days or more stay), age less than 2 years, need for mechanical ventilation, use of benzodiazepines and narcotics, use of physical restraints; and use of vasopressors and antiepileptics.[11]
- Dervan L conducted a study to determine risk factors associated with delirium in PICU. The results stated that risk factors associated with delirium in PICU patients were length of stay in PICU (more than or equal to 48 hours), children aged less than 2 years of age, baseline cognitive dysfunction, duration of mechanical ventilation and use of benzodiazepines.[12]

Conclusion

Pediatric Delirium is a complex manifestation of acute brain dysfunction in the critically ill child and is related to a number of predisposing factors The risk factors associated with delirium are younger age, severity of illness, cognitive dysfunction and use of benzodiazepines and narcotics. The uses of pharmacological interventions can prevent delirium but on the contrary several studies have reported delirium with use of benzodiazepines and narcotics. Non-pharmacologic interventions on the other hand can help prevent delirium or reduce the severity and duration. These interventions are music listening, massage, promoting sleep (e.g., use of earplugs), maintaining a regular day-night cycle, voiding overstimulation by light and sounds, mobilization, and family engagement.

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