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Comparing the Effectiveness of Curosurf and Beraksurf in the Treatment of Respiratory Distress in Premature Infants

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Abstract

Background: Research evidence has approved the effectiveness of surfactant prescription for respiratory distress syndrome (RDS). However, previous studies have not reported the priority of curosurf and Beraksurf. The present study aimed to compare the effectiveness of Iranian surfactant (beraksurf) and Italian surfactant (curosurf) in the treatment of pulmonary distress.

Methods: This clinical trial was performed on 80 premature infants with respiratory distress in NICU of Taleghani Hospital in Ilam, all of whom were treated with surfactant.

Results: There was no significant difference regarding the duration of needs for ventilation and/or oxygen, duration of hospitalization, pulmonary hemorrhage, bronchopulmonary dysplasia, intraventricular hemorrhage, patent ductus arteriosus (PDA) and pneumothorax between the groups ($p>0.05$).

Conclusion: Beraksurf seems to be as effective as curosurf in premature neonates with RDS, but is less expensive than it.

Key Words: Beraksurf, Curosurf, Infants; Premature, Surfactant.

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1- INTRODUCTION

Respiratory distress syndrome (RDS) in neonates is defined as the pulmonary failure in premature infants that is due to the lack of surfactant production (1, 2). 35% of premature neonates present with RDS; this makes it a leading reason for morbidity and mortality in this population (3, 4).

Prematurity is the commonest risk factor followed by white ethnicity, male gender, maternal diabetes, cesarean section, chorioamnionitis, low birth weight, birth asphyxia, lung infections and meconium aspiration syndrome (5, 6), antenatal steroids and prophylactic surfactant therapy have significantly reduced the incidence of many complications of prematurity (RDS, mortality)(7).

Giving surfactant intratracheally to premature infants with RDS reduces mortality and morbidity in these infants (8, 9).

Three types of surfactant are being used in the market: (1) animal derived surfactants (10), poor protein synthetic surfactants (11), and protein containing synthetic surfactants (12).

Among the surfactants available in Iran are curosurf (chiesi company, Italy), bovine lipid extract surfactant (BLES), and beraksurf (tekzima company, Iran).

Therefore, this study aimed to compare the efficacy beraksurf and curosurf in the treatment of RDS in premature infants.

2- MATERIALS AND METHODS

This study was a double-blinded randomized controlled trial on 80 babies with respiratory distress who met the inclusion criteria. The subjects were assigned into intervention and control groups. The control group (n=40) received 2.5 cc /kg of Curosurf through an endotracheal tube. The drug to treat the problem was developed and marketed by the Italian pharmaceutical company chiesi. The intervention group (n=40) received 4 cc/ kg of Beraksurf through the endotracheal tube. The drug to treat the problem was developed and marketed by the Tekzima Company.

In the first stage, the researcher used the main entry and exit conditions of the study to prepare a list of eligible infants to participate in this study. The research assistant contacted all eligible parents to register. If they wished to participate in this research study, general information and written consents were obtained from them and then Baseline assessment was performed. In this research, the evaluator was blinded. Then, 80 infants with respiratory access were randomly divided into two groups using block randomization method by hiding random allocation. Random sequencing was done using random numbers generated by a computer.

Upon completing the baseline evaluation, the patients were randomized to either intervention or control groups. Randomization was performed using a permuted block randomization method (with block sizes of 4 or 6 and allocation ratio of 1:1). Block randomization was used to reduce bias and achieve balance in the allocation of participants to treatment arms. The random allocation sequence was computer-generated (Kendall and Smith's Random Numbers Table), and was conducted by a statistician who was not a part of the research team. A random number table is a series of digits (0 to 9) arranged randomly in rows and columns, as demonstrated in the small sample shown below. The table usually contains 5-digit numbers, arranged in rows and columns, for ease of reading. The random allocation sequence was concealed in a sealed opaque envelope until the participants were assigned into two groups.

2-1. Inclusion criteria

1-Infants with respiratory distress syndrome at 26 to 37 weeks of gestation being treated with Surfactant Rescue 2-Premature babies with respiratory distress without any congenital anomalies, including heart abnormalities.

2-3. Statistical analysis

Data was analyzed using the Statistical Package for Social Science (SPSS v26). Descriptive analyses were performed. Quantitative data like GA and weight was described by mean and standard deviation (SD). Qualitative data like efficacy, gender and mode of delivery (NVD&CS) was presented by frequency and percentage. The difference between the groups was analyzed by chi square test and p value of <0.05 was significant.

2-2. Procedure

This study evaluates 80 preterm neonates with RDS requiring surfactant therapy. We, randomly, assigned 40 neonates to group A in which the administration of beraksurf with insure technique was done; and forty neonates were, randomly, assigned to group B in which the curosurf was administered with insure technique (**Fig 1**).

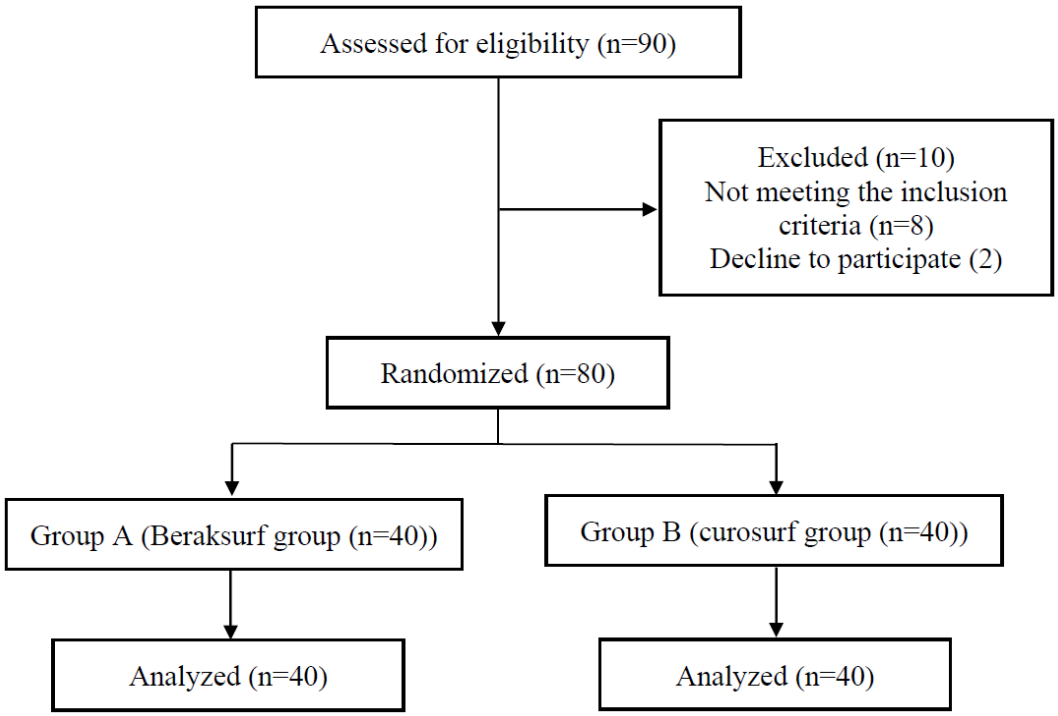

Fig. 1: Flow diagram showing the distribution of the preterm infants in the study

3- RESULTS

Gender analysis showed equal sex distribution between the two groups. The mean hospitalization period was 12.67 days in group A and 11.95 days in group B, with no statistical difference between the two groups (p=0.76). The mean gestational age was (32.58±2.90) in group A and (32.67±2.60) in group B (p=0.77). The mean birth weight was 2102.250±720.7 in group A and 2078.5±656.939 in group B (p=0.87). There were no significant differences in regard to sex, birth weight, gestational age, Oxygen requirement, ventilator requirement, duration of hospitalization and repeated dose between the two groups (P > 0.05, **Table 1**).

Table-1: Demographic and clinical characteristics of the groups

Variable (mean± SD)	Curosurf (A)	Braksurf (B)	P-value
Gender (male)	22(55%)	24(60%)	0.82
Gender (female)	18(45%)	16(40%)	
Birth weight (grams)	2102.250±720.7	2078.5±656.939	0.87
Gestational age (weeks)	32.58±2.90	32.67±2.60	0.77
Oxygen requirement (day)	9.5±10.23	7.72±7.58	0.38
Ventilator requirement (day)	2.32±3.61	1.80±2.80	0.47
Duration of hospitalization (day)	12.67±9.77	11.95±10.32	0.76
Repeated dose	1.05±0.31	1.175±0.59	0.24

Incidence of Intraventricular hemorrhage (IVH) was 5% in group A and 2.5% in group B, with no significant difference between the groups (p=0.55). Incidence of BPD was 7.5 5% in group A and 5% in group B, with no significant difference between the groups (p=0.64) (**Table 2**)

Table-2: Comparing the occurrence of complications between the two groups

Variable	Curosurf (A)	Beraksurf (B)	P-value
Pulmonary hemorrhage	4(10%)	4(10%)	p>0.05
IVH	2(5%)	1(2.5%)	0.55
BPD	3(7.55%)	2(5%)	0.64
PDA	10(5%)	5(12.5%)	0.15
Pneumothorax	3(7.5%)	0(0%)	0.24

IVH: intraventricular hemorrhage, BPD: bronchopulmonary dysplasia, PDA: patent ductus arteriosus

4- DISCUSSION

This study showed that the Beraksurf and Curosurf are equal in terms of their efficacy and complications in the treatment of respiratory distress in premature infants.

In the present study, in line with the results of a study by Gholami et al. (13) the infants in the two groups were not significantly different in mean gestational age, birth weight and Ventilator requirement.

Our results revealed that there was no significant difference between the groups in the incidence of BPD (%7.55 vs. %5), pneumothorax (%7.5 vs. % 0), and PDA (%28.3 vs. % 20).

In addition, this study showed that there were no statistically significant differences between the infants treated with Beraksurf and Curosurf regarding the incidence of IVH (%5 vs. % 2.5), which is inconsistent with the results of the study conducted by Fox et al. which reported 10% incidence of intraventricular hemorrhage in infants treated with Survanta and 8% in those treated with Curosurf (12).

Furthermore, in the present study, no statically significant difference was observed between the two groups in terms of the requirement to supplemental oxygen and requirement to ventilation, which is inconsistent with the results of the study conducted by Baroutis et al. They had compared survanta (Iranian equivalent to beraksurf) and Curosurf, finding a significant difference between them in terms of the requirement for supplemental

oxygen, ventilation, and the length of hospitalization in NICU (14).

Moreover, the results obtained in our study demonstrated no statically significant difference between the two groups regarding the additional dose. This finding is inconsistent with the results of Ramanathan et al. who compared the effects of Curosurf and Survanta (Beraksurf) in a multicenter, randomized controlled trial in the USA. The administration of Curosurf was associated with less day's requirement of oxygen, and fewer requirements to additional doses, and a decrease in the mortality rate of the preterm infants with less than 32 weeks of gestation. 36% of the infants to whom curosurf was administered vs. 68% in the survanta administered group received two doses or more ($p<0.05$) (15).

Overall, the price of Curosurf is 370$ in Iran (16), while Breaksurf costs only 102$. The price of this drug has greatly decreased due to its production in the country, and it is sold in Iran for one tenth of its price in the United States.

Due to the recent production of Beraksurf in Iran, further trials need to be conducted in other neonatal units on a larger scale so as to establish the efficacy of Beraksurf. In addition to obtaining more accurate results, these patients need to be followed up for long term outcomes.

4-1. Limitation

The main limitation of this study was that the patients in the two groups were not matched in terms of their APGAR scores, PPHN, pneumonia and asphyxia; thus, future studies could evaluate a narrower age group of neonates.

5- CONCLUSION

It is concluded that there is no significant difference between the administrations of both surfactants to preterm neonates in regard to the neonatal complications; but as Beraksurf is less expensive than Curosurf and its availability is easier than Curosurf, it deserves more studies for more decisive conclusions.

6- FUNDING

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7- AVAILABILITY OF DATA

The datasets used and/or analyzed in the current study are obtainable from the corresponding author on reasonable request.

8- ACKNOWLEDGMENTS

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