



P-ISSN: 2664-3685

E-ISSN: 2664-3693

IJPG 2021; 4(1): 07-10

Received: 07-11-2020

Accepted: 09-12-2020

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## Evaluation of the neonates on arrival with regards to transport associated morbidity by validating two scales: TOPS and TRIPS scores

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DOI: <https://doi.org/10.33545/26643685.2021.v4.i1a.116>

### Abstract

The common causes of neonatal deaths in India include infections, birth asphyxia, pneumonia and prematurity which contribute to 4, 2.2, 4.2, per 1000 live births respectively in 2015. Though institutional delivery and in-utero transport of new born is safest but unfortunately preterm delivery and perinatal illness cannot be always anticipated resulting in continued need of transfer of these babies after delivery. Antenatal details –including immunization, checkups and other antenatal risk factors like pregnancy induced hypertension, GDM, UTI, PROM etc. Natal and post natal history including mode of delivery, liquor quality and resuscitation details were recorded as per referral slip and sometimes told by mother if referral slip not available. Active resuscitation meaning neonates requiring bag and mask ventilation and or chest compression and or intubation. The TRIPS score and TOPS score did not show any statistical difference in relation to mode of transportation. However the rates in both the scores were increasing with poor transporting system.

**Keywords:** TOPS, TRIPS, neonates

### Introduction

Globally four million deaths occur every year in the first month of life. India alone contributes to about 20% of global births with 27 million live births each year with about 2 million under five annual deaths. About 0.75 million neonates die every year in India, the highest for any country in the world. The neonatal mortality rate (NMR) declined from 52 per 1000 live births in 1990 to 28 per 1000 live births in 2013. The daily risk of mortality in the first 4 weeks of life is ~30-fold higher than the post- neonatal period. This has resulted in a slow decline in NMR in most countries including India, and has hampered their achieving the MDG-4 by year 2015. And thus the ‘committing to child survival: A promise renewed’ goal of reducing under-five mortality to 20 or less per 1000 live births by 3035 will not be attained without specific efforts to reduce newborn mortality<sup>[1]</sup>.

The common causes of neonatal deaths in India include infections, birth asphyxia, pneumonia and prematurity which contribute to 4, 2.2, 4.2, per 1000 live births respectively in 2015.

Though institutional delivery and in-utero transport of new born is safest but unfortunately preterm delivery and perinatal illness cannot be always anticipated resulting in continued need of transfer of these babies after delivery. Significant decrease in neonatal mortality can be achieved with regionalization of perinatal care, where many sick new born can be provided with better care and outcome if they are timely transported in stable condition<sup>[2]</sup>.

In early 1960s, neonatal transport was first used to make intensive care accessible to those neonates who needed it. Subsequently, organized emergency neonatal transport systems developed and became an important component in the regionalization of perinatal care.

At the same time, facility of neonatal transport in India are not encouraging and are dismal, though Navjat Shishu Surksha Karyakram (NSSK) launched by government of India also highlights the role of safe neonatal transport<sup>[3]</sup>.

Neonatal transport is one of the most important predictors for the clinical outcome of neonates. A dedicated and coordinated efficient transport system is a vital link in the survival of neonates. In India many medical centers have advanced paediatric critical care but significant number of sick neonates reach these centers in an unorganized fashion without any stabilization or environmental control leading to increased morbidity and mortality.

Transportation of neonates is the greatest challenge faced today influencing the outcome of neonates in our country with limited transport service [4].

**Methodology**

- Antenatal details –including immunization, checkups and other antenatal risk factors like pregnancy induced hypertension, GDM, UTI, PROM etc.
- Natal and post natal history including mode of delivery, liquor quality and resuscitation details were recorded as per referral slip and sometimes told by mother if referral slip not available. Active resuscitation meaning neonates requiring bag and mask ventilation and or chest compression and or intubation.
- Transport details included mode of transport, distance covered accompanying person, time of referral, time of arrival
- TOPS and TRIPS score was applied to all neonates

Following definitions were used for assessment of newborn:

- Hypothermia and its grading: Axillary temperature was taken by digital thermometer (36.5\*c) and Observed temperature was graded as per standard guidelines of WHO.
- Cyanosis: presence of dusky soles with perioral cyanosis and not the cyanosis of oral mucosa.
- Delayed capillary filling time (CFT) was taken as more than three seconds.
- Respiratory distress was defined as Respiratory rate more than 60 /minute in a quite baby associated with deep lower chest wall in drawing with or without nasal flaring and/ or expiratory grunting.
- LBW: Birth weight less than 2.5 Kg irrespective of gestational age.
- Hypoglycemia was taken as blood glucose less than 40 mg/dl with reagent strips .
- Sepsis, Birth asphyxia, Hyaline membrane disease

(HMD), Meconium aspiration syndrome (MAS) were diagnosed as per standard guidelines provided by national neonatology forum.

After initial stabilization, newborns were assessed for maturity, clinical condition, individual morbidity and their outcome was assessed in terms of discharge, death and duration of stay.

**Statistical analysis**

- General characteristics of the patients were expressed as values of mean and standard deviation for quantitative variables and percentages for qualitative variables.
- Statistical analyses was been performed using chi-square and Fisher exact test were used. Sensitivity, specific positive and negative values of the clinical score in predicting mortality rate was calculated.

**Results**

There is significant difference in mean duration of stay in relation to TRIPS score, i.e. higher the score more will be the duration of stay on neonates in the hospital.

**Table 1:** Mean duration stay of neonates in relation to TRIPS score

Score	N= 98	mean DOS		P value
0 – 8	69	5.60	1 referred	0.0001
9 – 16	17	7.10		
17 -24	5	8.60	1 death	
25 -34	6	16.00		
35 -44	1	12		

There is significant difference in mean duration of stay in relation to TOPS score, i.e. higher the score more will be the duration of stay on neonates in the hospital.

**Table 2:** Mean duration stay of neonates in relation to TOPS score.

TOPS Score	N= 98	mean DOS		P value
0	26	5.3		0.0001
1	50	6.1	1 death 1 referred	
2	21	9.5		
3	1			

**Table 3:** TRIPS and TOPS scores in relation to distance and duration

	Distance	N= 100	TRIPS	P value	TOPS	P value
Distance covered in km	1 – 5kms	57	7.26	0.75	0.89	0.137
	6 – 15 kms	10	6.3		1	
	16 – 25 kms	18	13.9		1.13	
	40 - 50 kms	13	7.62		1.23	
	>50 kms	2	6		0	
	Duration	N =100	TRIPS	P value	TOPS	P value
Time of delivery to time of arrival at MVJ	1 –1 5 mins	47	7.53	0.114	0.915	0.652
	16 – 30 mins	19	5.88		0.833	
	31 – 45 mins	19	11.693		1.05	
	46 -60 mins	8	12.62		1.25	
	>60 mins	7	7.714		0.857	

The TRIPS score and TOPS score did not show any statistical difference in relation to mode of transportation.

However the rates in both the scores were increasing with poor transporting system.

**Table 4:** TRIPS and TOPS scores in relation to mode of transportation.

Mode of transportation	N= 100	TRIPS	P value	TOPS	p value
108	29	7.069	0.645	0.897	0.59
Pvt Ambulance	25	7.84		0.88	
taxi	40	9.175		1.075	
Auto	6	10.67		1.167	

All the components of TRIPS score (hypothermia, respiratory distress, hypotension, desaturation and activity of the baby) and TOPS score (hypothermia, hypoglycaemia, desaturation and peripheral perfusion) showed statistically significant on the neonates as the effect of transportation.

**Table 5:** Comparison of each parameters with TOPS and TRIPS score

Effects	N= 100	TRIPS	P value	TOPS	P value
Hypothermia	69	10.2	0.0001	1.304	0.0001
	31	4.06		0.258	
De-saturated	11	13.3	0.018	2	0.002
	89	7.28		1	
Hypotension	12	19.1	0.0001	2	0.001
	88	6.82		1	
hypoglycemia	9	22.2	0.0001	2	0.004
	91	6.95		1	
respiratory distress	39	10.3	0.054	1	Nan
	61	7.07		1	
lethargic	32	14	0.0001	1	Nan
vigorous	67	5.46		1	
seizures	1	Death			

The mean duration of stay on out born transported neonates were prolonged when compare to the stay of inborn, which statistically significant

**Table 6:** Comparison of out born with new born

Neonates	N= 100	MDOS	Ttest
Outborn neonates	100	4.8	0.000117
Inborn neonates	100	6.64	

**Discussion**

The present study objective was also to evaluate TRIPS and TOPS scores are comparable in terms of assessment of newborn.

In the present study both TRIPS and TOPS score did not show any statistical difference in terms of sex distribution, difference among SGA and AGA babies, difference among babies with and without maternal risk factors.

There was also no comparable statistical difference between TRIPS and TOPS scores in relation to mode of transportation as both were not statistically significant though majority of the babies travelled in private vehicles. However in both TRIPS and TOPS score there was increase in scoring rates with the poor quality of transportation.

And also both TRIPS versus TOPS score did not show any statistical difference in term distance and duration travelled by the referred neonates to the higher center. As in the present study most of the neonates travelled are from shorter distance and the newborns who travelled from longer distance were very few, hence could not make any statistical difference in the evaluation

In the present study both TRIPS and TOPS score showed statistical significance in terms of stabilization of babies during transportation to prevent hypothermia and also the effect of transportation with respect to the scoring

parameters. As both scores did not show any statistical difference and are comparable.

All the variations were normal between TRIPS and TOPS score. However in terms of accompanying person or facility of transportation, TRIPS score was more sensitive in picking up the abnormality than TOPS score as TRIPS score showed statistical significance with babies accompanied by mother had a better outcome when compare babies carried by ambulance technicians or by others.

The studies done by K lee *et al*, M Narang *et al* showed the TRIPS score as a good predictor of neonates who are transported and helps in predicting the outcome of the babies [5, 6].

Whereas the studies done by Datal E *et al*, Punith P *et al* showed the TOPS score are good predictor of neonates who are transported and helps in predicting the outcome of the babies diagnosed as per standard guidelines provided by national neonatology forum [7, 8].

Similarly the present study showed both TRIPS and TOPS are equally good scoring system for assessing the transported neonates and are indicator of quality of transport in terms of duration, facility of transport and also indicates the stabilization of babies during transportation. However TRIPS and TOPS scoring systems are equally good, no one aspect of either of the scoring system is superior to the other. However TOPS score has minimal parameters, easily administrable and less time consuming in assessing baby when compared to TRIPS score.

The study confirms the effect of transportation in increasing the morbidity and mortality as compared to the control group who are the babies born in our hospital. So evidence of increase in morbidity in terms of duration of stay was longer in out born babies when compare to inborn babies. The morbidity and mortality could also be contributed by quality of care given in the tertiary hospital service than in primary health centers which can be the cause for prolong stay of out born babies. Similarly the study done by S Saranappa *et al*. [9] showed the mortality of inborn neonates was 1.9% when compare to out born neonates 5.7%. Thus the much known fact that newborn under continued care in intensive care settings will definitely have better prognosis than the child transported with suboptimal care [10].

Thus the significant decrease in neonatal morbidity and mortality can be achieved with regionalization of perinatal care, where many sick new born can be provided with better care and outcome if they are timely transported in stable condition. A dedicated and coordinated efficient transport system is a vital link in the survival of neonates and which is lacking in India and need to be addressed which helps in decreasing the neonatal mortality rate.

Also both TRIPS and TOPS scores shows highly significant value for the babies who affected to all the components in the scoring system of both the scores.

Both the scores also shows highly statistical difference in the out of the baby. (TRIPS p value = 0.0001 and TOPS P value = 0.0001). There is also significant statistical positive correlation of both TRIPS score (0.59; P value = 0.0001)

and TOPS score (0.65; P value = 0.001) in the outcome of the transported neonates.

The studies by K lee *et al*, M narang *et al* shows the TRIPS score as a good predictor of neonates who are transported and its scores predicting the outcome of the babies [5, 6].

The studies by Datal E *et al*, Begum A *et al*, Punith P *et al* shows the TOPS score good predictor of neonates who are transported and its scores predicting the outcome of the babies [7, 8].

Similarly even the present study shows both TRIPS and TOPS are equally good transportation scores for assessing the transported neonates and also gives the clue about improper transportation, improper or unavailability equipments in the transportation, unskilled technician, and improper stabilization during the transportation which affects neonatal outcome. However, TOPS score has minimal parameters, easy to assess and shows equally as good as TRIPS score in predicting the outcome of transported neonates so with the present study TOPS score can be used than the TRIPS score.

### Conclusion

TOPS and TRIPS scores are based on evaluating the physiological illness of the neonates after transportation and have been found to be very successful in evaluating the newborn on transport care and primary care procedure.

Our study concluded that TOPS and TRIPS scores have got good predictive ability regarding morbidity that new born suffer as a result of transport and thus resulting in mortality.

Hence evaluation of TOPS and TRIPS score which are used interchangeably can be a useful guide to resource limited settings.

Hence TRIPS and TOPS score should be adopted as a standard technique of evaluation right from the point of transport, enroot and on arrival, so that the objective care evaluation can be done on transport.

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