ORIGINAL ARTICLE

Infant and Young Child Feeding practices and risk factors of SAM among beneficiaries of Nutrition Rehabilitation Centre – a cohort study

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ABSTRACT

Introduction: Mission Balam Sukham's Nutrition Rehabilitation Centre (NRC) combats malnutrition through prevention, treatment, and community engagement, ensuring children receive adequate nutrition for healthy growth. **Objective**: To document IYCF practices and risk factors of severe acute malnutrition (SAM) among NRC beneficiaries **Methodology:** A prospective cohort study was conducted comprising of 63 children aged 6 months to 5 years having SAM alongwith complications admitted at NRC of South Gujarat over the duration of 10 months. **Observations:** 90.5% poverty, 57.1% migrants, 7.9% single parent. 69.8% initiated breastmilk within 1hr, 15.9% weren't fed with colostrum, 6.3% were given pre-lacteals. 93.7% were exclusively breastfed, 6.3% initiated breastmilk at the time of 6 months. 16%, 60% and 9.8% met the criteria of MDD, MMF and MAD respectively. Boys show significant association on admission and discharge both (t = 2.43, p= 0.026 on admission and t= 2.66, p= 0.015 on discharge). In 13-24 months, MDD group (t = 2.34, p=0.02), children not suffering from anaemia shows significant weight (t=-2.540, p=0.18). **Conclusion & Recommendations:** Children's weight improvement is linked to better IYCF practices, emphasizing its importance of caregiver attention and education, highlighting need to address cultural barriers and promote practices like exclusive breastfeeding and continuous breastfeeding, focusing on empowering mothers and caretakers.

KEYWORDS

IYCF; NRC; Nutritional Outcome

INTRODUCTION

Nutrition Rehabilitation Centre (NRC) at the tertiary care level is one of the initiatives of Mission Balam Sukham to manage SAM children.(1) At NRC, the SAM children with or without complications are provided with medical and therapeutic care along with special attention on appropriate and adequate

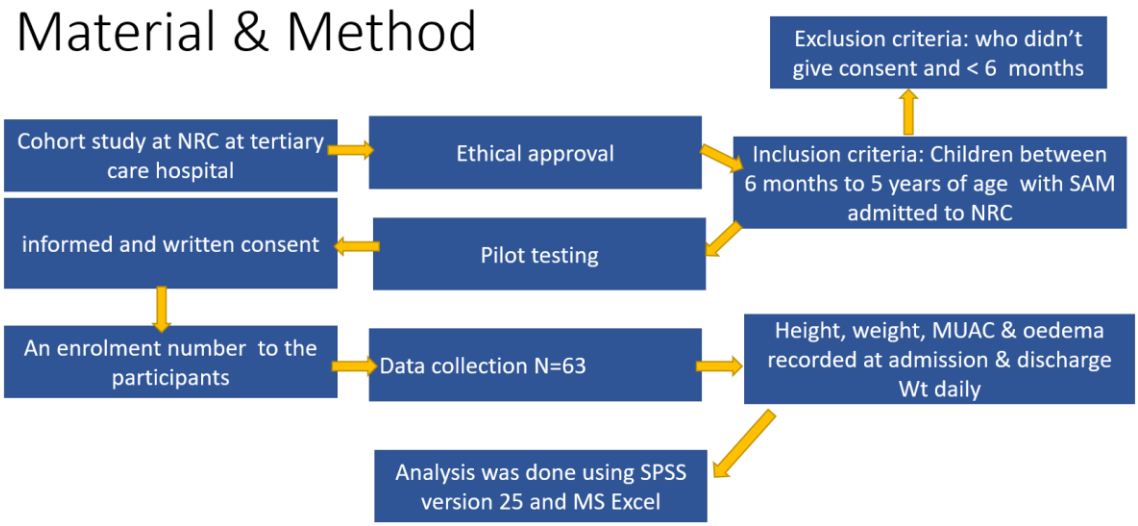
feeding habits timely for a period of a minimum of 14 days along with the incentives which they lose as daily wages.(1) The link between infant and young child feeding practices and the NRC component is vital for several key reasons: 1) Prevention of Malnutrition: The program promotes healthy feeding from birth to prevent malnutrition, ensuring children receive adequate nutrition through breastfeeding and complementary foods.(2,3) 2) Addressing Malnutrition: The NRC offers specialized care, including nutritional rehabilitation and healthy feeding education, for children already malnourished or at risk, supporting their immediate nutritional needs and recovery.(4) 3) Community Engagement: The program focuses on community involvement to change feeding practices, addressing factors like food access and knowledge about healthy feeding, crucial for long-term malnutrition prevention.(5) 4) Sustainability: Integrating healthy feeding into daily routines aims to create lasting changes benefiting children's health and development over time.(6) The present study will contribute to the limited studies infant and young child feeding practices among beneficiaries of NRC and to document risk factors of the SAM admitted at NRC. The objective of this study is to document infant and young child feeding practices among beneficiaries of NRC and to document risk factors of SAM in children at the time of admission in the NRC.

Material & Methods

A prospective cohort study was conducted over the period of 10 months in 2021 at the NRC of South Gujarat's tertiary care hospital. The study included children aged 6 months to 5 years with SAM, whose mothers' consented to participate.

Ethical Concerns: Ethical approval was obtained from the Human Research and Ethical Committee, Government Medical College, Surat (No. GMCS/STU/ETHICS/Approval/ 31405/19) before initiation of the study.

Figure 1: Flowchart of Methodology



Sample size: This study aimed to enroll 120 consecutive participants, leveraging G*Power 3.1.9.2 software to calculate the required sample size prior to data collection.(7) This calculation was based on a F-test for multiple regression analysis, incorporating ten predictors identified from relevant literature, setting effect size at $f^2 = 0.281$, with an alpha level (α) of 0.05 and a desired statistical power (1 - β) of 0.95. This approach led us to estimate a necessary sample size of 97 participants. However, anticipating a potential dropout rate of 20%, it was decided to enroll a total of 120 participants to ensure sufficient data for analysis. Unfortunately, the COVID-19 pandemic disrupted data collection process,

limiting the bed availability for participant enrollment. Despite these challenges, data collection period was managed over 10 months to include 63 patients admitted and were considered for analysis. Inclusion criteria were children aged 6 months to 5 years with SAM admitted to the NRC, excluding those under 6 months or without parental consent.

A predesigned questionnaire, developed from extensive literature, was used to collect demographic data and factors influencing the outcome. Data was confidentially handled, with participants identified only by a unique ID. A written consent was obtained from mothers or caregivers, who were interviewed using a pilot-tested questionnaire on an ODK application.

Anthropometric measurements, including length/height, weight, and mid-upper arm circumference, were recorded at admission and discharge. The study ensured the confidentiality of participant data, with no personal identifiers disclosed.

Few definitions that have been used in the study are:

Minimum meal frequency (MMF) is the proportion of breastfed and non-breastfed children 6–11 months of age who receive solid, semi-solid, or soft foods (also including milk feeds for non-breastfed children) the minimum number of times or more. It should be 2 times for 6-8 months of breastfed infants, 3 times for 9-23 months of breastfed children and 4 times for 6-23 months of non-breastfed children.(8,9)

Minimum dietary diversity (MDD) is defined as the proportion of children 6–23 months of age who receive foods from 4 or more food groups. The food is classified into seven groups consumed in the past 24 hours. Each food classification is given a score of one if the food is consumed. The food group includes; grains, roots, tubers; legumes and nuts; dairy products; flesh foods (meat, fish, poultry, organs; eggs; vitamin A-rich fruits and vegetables, and other fruits and vegetables.(10)

Minimum Acceptable Diet (MAD) for infants and young children (IYCF) is an indicator used to assess whether children aged 6-23 months receive a diet that meets their nutritional needs for growth and development. It combines two key components: Minimum Dietary Diversity (MDD) and Minimum Meal Frequency (MMF).(11)

Anaemia: According to the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), anaemia in children aged 6-59 months is defined as: normal (non-anaemic) if haemoglobin (Hb) level is >11.0 g/dl, mild anaemia if Hb level is 10.0-10.9 g/dl, moderate anaemia if Hb level is 7.0 -9.9 g/dl and severe anaemia if Hb level is <7.0 g/dl. (12)

RESULTS

A total of 63 children were included in the analysis. The questions for which responses were not received from study participants have not been considered for analysis and accordingly sample size (n) has been depicted in the tables. 46% were girls. 39.7% of the children had an episode of infection in the previous 1 month of admission. All of them had diseases on admission. 34.9% participants belonged to 7-12 months, 44.4% belonged to 13-24 months, 14.3% belonged to 25-36 months and 6.3% to 37-48 months.

Table 1 Distribution of study participants admitted in NRC according to socio-demography

	Variables	Category	Frequency (%)
Sociodemographic variables	Socioeconomic classification as per modified BG Prasad's classification (n=60)	I	2 (3.1)
		II	4 (6.3)
		III	25 (39.6)
		IV	17 (26.9)
		V	15 (23.8)

	Variables	Category	Frequency (%)
	Migration status (n = 63)	Yes	36 (57.1)
		No	27 (42.9)
	Single parent (n=63)	Yes	5 (7.9)
		No	58 (92.0)
	Family size (n=63)	≤5	42 (66.6)
		>5	21 (33.2)
	No. of children in a family (n=63)	1	19 (30.2)
		2	27(42.9)
		≥3	17(27.0)
	Birth spacing in years (n= 39)	1-2	20 (51.3)
		2-3	6 (15.4)
		>3	13 (33.3)
Housing & Environment	Water supply at house (n= 63)	Yes	51 (81.0)
		No	12 (19.0)
	Toilet facility (n= 63)	Yes	49 (77.8)
		No	14 (22.2)
	Cooking fuel (n= 63)	LPG	47 (74.6)
		Wood/Coal	15 (25.3)
Mother-specific characteristics *n=59, as four study participants did not have the mother	Mother's age (years)	18-23	25 (42.4)
		24-29	26 (44.1)
		30-35	8 (13.6)
	Mother's education	Illiterate	31 (52.5)
		Primary and above	28 (47.5)

Table 2 Distribution of study participants according to child feeding practices (n=63)

	Category	Frequency n (%)
Initiation of breastfeeding at birth	<1 hour	44 (69.8)
	> 1 hour	10 (15.9)
	Not given	9 (14.3)
Colostrum given	Yes	53 (84.1)
	No	10 (15.9)
Pre-lacteals given	Yes	4 (6.3)
	No	59 (93.7)
Exclusive BF for 6 months	Yes	59 (93.7)
	No	4 (6.3)
Breastfeeding status for <2years (n =56)	Yes	44 (78.6)
	No	12 (21.4)
Initiation of complementary feed in months	<6	4 (6.3)
	6	4 (6.3)
	6-8	31 (49.2)
	>8	18 (28.5)
	Not started	6 (9.5)
Mode of complementary feeding (n =57)	Spoon katori	57 (100.0)
	Bottle feeding	0
Hand wash before a feed (n =57)	Yes	57 (100.0)
	No	0
Frequency of meal per day (n =57)	1-2	10 (17.6)
	3-4	45 (78.0)
	>4	2 (3.5)
Minimum Dietary Diversity † (n =51)	Met	8 (16.0)
	Not Met	43 (84.3)
Minimum Meal Frequency † (n =51)	Met	27 (60.0)
	Not Met	24 (40.0)
Minimum Acceptable Diet † (n =51)	Met	5 (9.8)

	Category	Frequency n (%)
	Not Met	46 (90.2)
Stoppage of feeding by caretaker during an illness of the child	Yes	4 (6.3)
	No	59 (93.7)
Reason to start complementary feed (n =57)	Knowledge	37 (64.9)
	The baby was not satisfied	15 (26.3)
	Others	5 (8.7)

** MDD, MMF, MAD applies to children below 2 years of age*

Other factors prompting the introduction of complementary foods included concerns over the infant's weight gain, the mother's expiration, the mother's preference, and insufficient breast milk production. Notably, 93.7% of caregivers continued feeding their infants during illness.

Figure 2 Distribution of study participants admitted in NRC according to complementary food fed to the child (multiple responses)

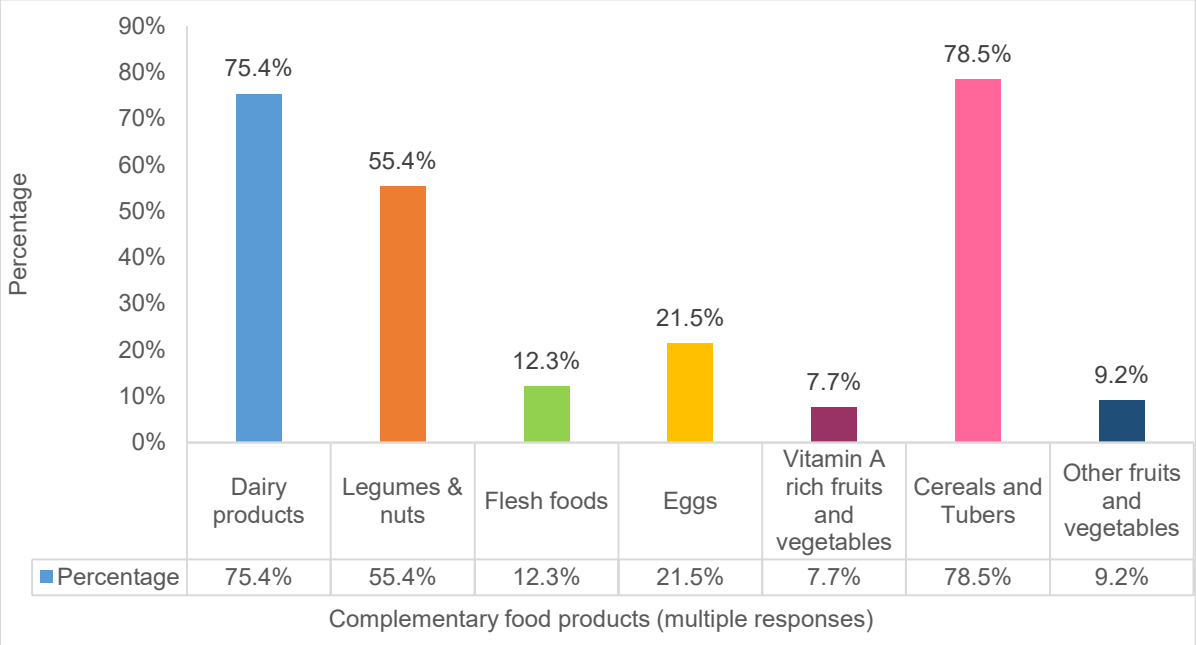


Table 3 Prevalence of anaemia in study participants admitted in NRC according to age in months

Age in months	Normal (%)	Mild anaemia (%)	Moderate anaemia (%)	Severe anaemia (%)	Total n
7-12	3 (13.6)	6 (27.2)	9 (40.9)	4 (18.1)	22
13-24	5 (17.8)	5 (17.8)	14 (50.0)	4 (14.2)	28
25-36	1 (11.1)	2 (22.2)	5 (55.5)	1 (11.1)	9
37-48	0	0	4 (100.0)	0	4
Total	9 (14.2)	13 (20.6)	32 (50.7)	9 (14.2)	63

Table 4 Distribution of mean weight in kg on admission and discharge according to various characteristics for age group

		Mean weight in kg							
		7-12		13-24		25-36		37-48	
	Category	Admission	Discharge	Admission	Discharge	Admission	Discharge	Admission	Discharge
Gender	Boy	*5.72	*6.13	7.03	7.36	7.59	7.48	-	-

		Mean weight in kg							
	Girl	4.70	4.96	6.71	7.02	6.70	6.95	7.20	7.36
Vaccination status complete	Yes	5.50	5.80	6.92	7.24	7.06	7.11	7.45	7.88
	No	4.78	5.44	6.71	6.96	8.30	8.45	6.45	5.80
Colostrum given	Yes	5.38	5.71	6.83	7.20	7.24	7.33	7.20	7.36
	No	5.30	5.87	7.12	6.80	6.80	6.95	-	-
Pre-lacteals given	Yes	5.00	6.30	7.80	8.20	6.75	7.30	-	-
	No	5.38	5.71	6.85	7.16	7.32	7.27	7.20	7.36
Current breastfeeding status (<2 years)	Yes	5.51	5.86	6.99	7.34	7.30	7.18	-	-
	No	4.74	5.19	6.67	6.81	7.02	7.70	7.70	7.37
Minimum Meal Frequency	Met	5.39	5.98	6.99	7.25				
	Not Met	5.63	5.84	6.40	6.77				
Minimum Dietary Diversity	Met	5.22	5.45	7.90	*8.10				
	Not Met	5.33	5.77	6.66	7.00				
Minimum Acceptable Diet	Met	4.82	5.02	7.87	7.88				
	Not Met	5.40	5.78	6.77	7.19				
Disease in last 1 month	Yes	5.77	6.38	6.67	7.08	7.41	7.44	6.70	7.35
	No	5.16	5.41	7.06	7.29	7.02	7.12	7.70	7.37
TLC on admission per cu.mm	4000-11000	5.57	6.01	6.61	7.02	7.63	7.55	7.40	7.35
	>11000	5.20	5.50	7.20	7.40	6.97	7.12	7.13	7.37
Anaemia	Absent	4.65	5.18	*5.79	6.51	6.20	6.25	-	-
	Present	5.46	5.79	7.14	7.35	7.32	7.43	7.20	7.36

*Note: * statistically significant; † MDD, MMF, MAD applies to children below 2 years of age*

The study reveals that on applying paired t-test no significant association among all variables, with the exception of boys aged 7-12 months, who exhibit a notable association on both admission and discharge (t = 2.43, p= 0.026 on admission and t= 2.66, p= 0.015 on discharge). Additionally, children aged 13-24 months, those in the MDD group (t = 2.34, p=0.02), and children not affected by anaemia show significant weight changes (t=-2.540, p=0.18).

DISCUSSION

Planning and evaluation are essential for combating undernutrition in children under 5. Our findings, similar to those by Taneja et al (40%) and Hashmi G et al (41.77%), show 44.4% of children are 13-24 months old, suggesting higher disease risk and care needs due to feeding practices.(13,14) A gender disparity, with 46% girls in our study, may reflect societal preferences, contrasting with higher SAM rates in girls, necessitating gender-targeted interventions.(8,15,16)

About one-third of children had infections in the last month, indicating at malnutrition's role in recurring infections. All children had at least one disease at admission, possibly contributing to SAM. The study showed 85.5% were anaemic, similar to 79.7% in Gujarat, indicating malnutrition's impact on health.(17)

53% of mothers were illiterate, with rest educated with primary and above. Illiteracy hampers logical thinking and decision-making,

leading to earlier childbearing and lower primary care quality, including nutrition, as care quality depends on both knowledge and practices. This increases the risk of SAM as seen in Jyoti Sanghvi et al.(16).

Poverty and food insecurity, worsened by insufficient maternal knowledge on feeding, significantly contribute to child malnutrition.(18) 2/3rd of families fall into the poor socioeconomic class (Class III, IV and V), aligning with Taneja G. et al. and Hashmi G et al.'s findings of 56.47% from class V. (13,14)

Over half (57.1%) of children were migrants, underscoring the importance of the home environment in child development and migration.(19) Among 7.8% with single parents, 80% lacked maternal care, crucial for development. Many families had two children (42.9%), and 27% had three or more, indicating a division of maternal responsibilities.

Birth spacing was more than 3 years in 35% of mothers and 1-2 years in over half. Inadequate spacing is a risk factor for SAM children. Families ranged from 2-5 members to 6-9, with very few having more than 10. Large families lead to overcrowding, decreased food availability, and poor hygiene, causing recurrent infections.

Breastfeeding practices

70% of mothers began breastfeeding within 1 hour of birth, with 14.3% not breastfed at birth, reflecting community awareness about early breastfeeding. Initiation rates were similar to Aprameya et al (72%) and Jyoti Sanghvi et al (94.2%).(16,20) Most children were fed colostrum, but only 4% received pre-lacteals, suggesting a need for awareness to avoid pre-lacteals just like another study(4.2%).(21) Almost all children (93.7%) were exclusively breastfed, aligning with a 95% rate in Dabhoda, Gujarat.(21)

Complementary feeding practices

Our study shows 90.4% of infants received complementary food, with half (49.2%) introducing it at 6-8 months, 28.5% delaying after 8 months, and 6.3% starting before 6 months. Some delays were due to misconceptions of their knowledge about breastfeeding exclusively for more than 6 months. The 49.2% initiation rate at 6-8 months in our study is higher than Gujarat's state prevalence (42.0%)(17), indicating a positive trend but also highlighting delayed feeding, a potential cause for SAM. Most mothers (64.91%) started complementary feeding due to knowledge, 26.31% because their babies were not satisfied with breast milk, and 8.7% for other reasons like weight gain issues or mother's decision.

40% of children received minimum meal frequency, possibly due to domestic chores or work, or by another caretaker. In South Asia, it's 47.0%, highlighting the influence of family income and resource management on meal frequency.(22)

Poor diet diversity is prevalent in low-income populations, with our study showing very low dietary diversity (16.0%), similar to Indian studies' low results of 25% and 28.3%.(21,23) The diet was mostly cereals and tubers (78.5%), followed by dairy products (75.4%), legumes and nuts (55.4%), with few consuming other fruits and vegetables (9.2%). Eggs and flesh foods were also consumed with low consumption of vitamin-A rich fruits and vegetables (7.70%) and iron-rich flesh foods (4.73%) might contribute to anemia, indicating a need to encourage their consumption. Most mothers cannot afford expensive animal and vegetable products.

Mothers should provide varied diets and meet the minimum acceptable diet (MAD) criteria. However, only 9.8% of children met this. The minimum meal frequency (MMF) was adequately provided in 95.6% of cases, but MAD was met by only 28.3% of children(21), similar to South Gujarat's 44.3%.(24) Achieving MAD is challenging for poor socioeconomic mothers due to food security. All mothers did not bottle-feed, aligning with WHO's discouragement of bottle feeding for hygiene concerns. Spoon-katori feeding was practiced by all mothers after handwashing, and all children were fed a higher amount of dairy products.

In our society, stopping feeding during illness is common, but not observed in 93.7% of our study's caretakers. Diarrhoea and ARI are the

infections that significantly predict underweight. Diarrhoea was the most common disease, followed by ARI and few cases of measles, likely due to unhygienic conditions. Among diseases on admission, diarrhoea was most common, followed by acute gastroenteritis, ARI, and anaemia. Dehydration was reported in 15.87% of diarrhoea cases. The study shows that malnutrition, infection, and diseases are interconnected, affecting children's dietary intake and nutritional status.(25)

A statistically significant difference was observed between the mean weight at the admission of age group 13-24 months and the mean weight at the discharge of 13-24 months of MDD group. (t = 2.34, p=0.02) and anaemia (t=-2.540, p=0.18). Another study observed the consumption of a MDD was more common in children more than 12 months of age - the proportion of children getting MDD nearly doubles across all regions between 6-11 months and 12-17 months.(22)
Hence, out of 63 children, only 13 children (20.63%) could achieve their targeted weight gain. In a study by Hashmi G et al, 14% of children achieved a target weight of 15% more than the weight at admission.(14) 18.4% could achieve target weight in a study by Aguyo et al.(26)

Conclusion

NRC effectively improved children's weight, emphasizing the need for caregivers' attention in nourishment. Our findings suggest better IYCF practices, yet some indicators, like the MAD score, indicate a lack of MDD and MMF combination. This highlights the need for education on IYCF guidelines to combat child malnutrition, with a focus on empowering mothers and caretakers, and girls, to make informed decisions about feeding practices. Cultural and traditional barriers should be addressed to promote IYCF practices, including exclusive breastfeeding for 6 months, starting complementary feeding at 6 months, and continuing breastfeeding for 2 years and beyond.
The study examines various factors, including gender, migration, caretaker relationship, parental status, mother's age, education, work status, socioeconomic class, birth order, vaccination, antenatal care, delivery place, full term delivery, birth weight, IYCF practices, dietary diversity, meal frequency, and diseases, affecting children's health in the NRC. It underscores the role of socioeconomic status and feeding practices in health outcomes. The study advocates for targeted interventions to tackle common diseases and health issues, suggesting further research on NRC's effectiveness post-study.

Recommendation

The study advocates for targeted interventions to tackle common diseases and health issues, suggesting further research on NRC's effectiveness post-study.

Limitation of the Study

Due to the pandemic COVID-19, we couldn’t accomplish desired sample size which was intended to be 120. The in-patient bed capacity was reduced to 5 during COVID-19 from 10. Malnutrition not only depends on dietary diversity but also on the quantity of food which we haven’t taken into consideration.

Relevance of the Study

The study highlights critical infant and child feeding practices currently neglected, urging the NRC to prioritize them.

Authors Contribution

All authors have contributed equally.

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Nil

Conflict of Interest

There are no conflicts of interest.

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Declaration of Generative AI and AI Assisted Technologies in the Writing Process

The authors haven’t used any generative AI/AI assisted technologies in the writing process.

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