Feeding and Infant Sleep

Subjects: Pediatrics

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Inconsistent conclusions from infant sleep and feeding studies may influence parents feeding-related decisions. Exclusively breastfed infants (≤6 months-of-age) had a greater number of night wakings, but most studies reported no difference in night-time and 24 h sleep duration compared to formula-fed infants. However, after 6 months-of-age, most studies reported breastfed infants to sleep less in the night-time and over 24 h compared to formula-fed infants. Furthermore, studies reported no association between the timing of introduction to complementary foods and infant sleep duration (<12 months-of-age).

infant sleep feeding mode complementary feeding sleep duration night wakings night-time sleep

1. Introduction

Feeding type and sleep patterns are dynamic processes throughout the first year of life and have significant effects on health and development [1][2]. The World Health Organization (WHO) recommends exclusive breastfeeding for the first completed six months of life, with the introduction of complementary foods after six months-of-age [2]. Breastfeeding provides short- and long-term benefits to both infants and mothers, including protection against acute and chronic disorders among infants and as they grow older [3][4]. Sleep during the first year of life is especially important due to the rapid changes that occur in the consolidation of sleep/wake patterns [5][6][7]. The quantity and quality of an infant's sleep are associated with cognitive function such as the development of memory and language [8], and the ability to learn [9][10]. In addition, insufficient sleep and sleep problems have been associated with later obesity [11] and behavioral issues such as tantrums and other behavioral management problems [12]. Frequent and extended night wakings, one of the most common infant-sleep-related problems, has also been shown to affect infant health and development [13][14][15]. Therefore, sufficient sleep during infancy is a priority [8] and is often one of the main issues reported by new parents, with frequent parental night wakings shown to affect parent mood and function [13][14][15][16]. An estimated 20–30% of children experience sleep problems during the first three years of life according to a cross-sectional study conducted in New Zealand and Australia, with one-third of parents reporting their infants as having a sleep problem [17].

A number of studies have examined the relationship between sleep and feeding among infants. The timing of introduction to complementary foods has been associated with infant sleep patterns, with breastfeeding reportedly playing a role in increasing sleep disturbances [17][18][19][20][21], while other studies have not found such significance [22][23]. The potential association between type of milk feeding or the timing of introduction to complementary foods

and sleep may drive parental beliefs that early introduction to complementary foods or changes to the type of milk feeding, contrary to current recommendations [2], may improve their infants' sleep patterns [19][24]. The lack of consistency of the available evidence could be a source of confusion for parents, thereby affecting feeding-related decisions during the first year of life.

2. Current Studies

2.1. Type of Milk Feeding and Infant Sleep

21 studies reported on type of milk feeding in relation to infant sleep patterns as shown in **table 1**. The type of milk feeding was reported prospectively by parents or caregivers through questionnaires [17][19][23][25][26][27][28], interviews [29][30], feeding logs [31][32][33], and by maternal self-report [34][35][36][37][38][39] except for one study [40], that assessed type of milk feeding retrospectively through a questionnaire. Two studies [41][42] did not specify their assessment methods.

Table 1. Type of milk feeding among infants aged ≤ 6 months, >6 months, and 0–12 months in relation to sleep variables including 24 h sleep duration, total night-time sleep, night-waking frequency, duration of night wakings, longest sleep period, and sleep onset latency.

24 h Sleep Duration							
Author, Year	**Infant Age at Assessment/Assessment Frequency**	**≤6 Months**		**>6 Months**	**0–12 Months**	**Statistics [1]**	**Quality Rating [2]**
		EBF vs FF [1]	**BF vs. FF [1]**	**BF vs. FF [1]**	**BF vs. FF [1]**		
Berger et al., 2017 [32]	16 weeks		BF vs. FF mean ± SE (h) 12.95 ± 0.51 vs. 11.43 ± 0.53, p = 0.047			*t*-test	6
Butte et al., 1992 [41]	17 weeks		BF vs. FF mean ± SD (h) 13.2 ± 2.3 vs.13.3 ± 0.9, p > 0.05			*t*-test Regression	5
Figueiredo et al., 2017 [28]	2, 13, 26 weeks	EBF vs. FF mean ± SD (h) 2 weeks	BF vs. FF mean ± SD (h) 2 weeks 12.18 ±			Multivariate Analyses of Chi MANCOVA [3]	5

24 h Sleep Duration							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
		EBF vs FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
		13.43 ± 2.34 vs. 12.29 ± 2.27, p > 0.05 13 weeks 13.05 ± 1.87 vs. 12.87 ± 2.44, p > 0.05 26 weeks 12.37 ± 1.76 vs. 12.79 ± 1.05, p > 0.05	3.02 vs. 12.29 ± 2.27, p > 0.05 13 weeks 12.41 ± 2.21 vs. 12.87 ± 2.44, p > 0.05 26 weeks 12.73 ± 1.48 vs. 12.79 ± 1.05, p > 0.05				
Kaley et al., 2012 [26]	4–10 weeks		BF vs. FF Total sleep not assoc. with feeding, p > 0.05			Correlation ANOVA	4
Lee et al., 2000 [29]	2–17 weeks	EBF vs. FF mean ± SD (min) 902.4 ± 119.1 vs. 854.8 ± 130.7, p < 0.01				Unpaired t-test	4
Quillin et al., 2004 [35]	4 weeks		*BF* vs. *FF* mean ± SD (h) 13.1 ± 1.4 vs. 14.4 ± 1.1, p = 0.006			t-test	4
Tikotzky et al., 2011 [39]	26 weeks	EBF vs. FF No assoc. between				Spearman rho correlations	6

24 h Sleep Duration							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
		EBF vs FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
		total sleep and EBF (r = 0.15, p > 0.05)					
Nevarez et al., 2010 [23]	26, 52 weeks [4]		BF +/− food vs. FF +/− food Bivariate 26 weeks β = 0.05 (95%CI: −0.14 to 0.24), p > 0.05 Multivariate 26 weeks β = −0.15 (95%CI: −0.37 to 0.07), p > 0.05	BF +/− food vs. FF +/− food Bivariate 52 weeks β = 0.02 (95%CI: −0.17 to 0.20), p > 0.05 Multivariate 52 weeks is β = −0.17 (95%CI: −0.37 to 0.03), p > 0.05		Bivariate Multivariate linear regression [5]	5
Heinig et al., 1993 [42]	39 weeks			BF +/− food vs. FF +/− food 24 h sleep at 39 weeks greater in FF compared to BF grps, p < 0.05		t-test	4
Morgan et al., 2004 [30]	39 weeks [4]			BF +/− food vs. FF +/− food mean ± SE (h) 11.2 ± 0.1 vs. 11.4 ± 0.6, p = 0.01 [6]		ANCOVA [7]	5

24 h Sleep Duration							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
		EBF vs FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
Huang et al., 2016 [36]	0–34 weeks				BF +/− food vs. FF +/− food BF 2.1% lower (30 min less) 24 h sleep % than FF, $p = 0.0009$	Multilevel mixed models	4

Total Night-Time Sleep							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
		EBF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
Berger et al., 2017 [32]	16 weeks		BF vs. FF mean ± SE (h) 9.50 ± 0.38 vs. 7.33 ± 0.39, $p < 0.0001$			*t*-test	6
Butte et al., 1992 [41]	17 weeks		BF vs. FF mean ± SD (h) 8.2 ± 1.6 vs. 9.9 ± 1.4, $p < 0.04$			*t*-test Regression	5
Figueiredo et al., 2017 [28]	2, 13, 26 weeks	EBF vs. FF mean ± SD (h) 2 weeks 7.08 ± 1.33 vs. 6.34 ± 1.21, $p > 0.05$	BF vs. FF mean ± SD (h) 2 weeks 6.77 ± 1.55 vs. 6.34 ± 1.21, $p > 0.05$ 13 weeks 8.12 ± 1.22			Multivariate Analyses of Chi MANCOVA [3]	5

24 h Sleep Duration							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
		EBF vs FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
		13 weeks 8.06 ± 1.30 vs. 8.27 ± 1.35, p > 0.05 26 weeks 8.29 ± 1.36 vs. 8.29 ± 1.07, p > 0.05	vs. 8.27 ± 1.35, p > 0.05 26 weeks 8.93 ± 1.21 vs. 8.29 ± 1.07, p > 0.05				
Kaley et al., 2012 [26]	4–10 weeks		BF vs. FF NTS duration not assoc. with feeding, p > 0.05			Correlation ANOVA	4
Quillin et al., 1997 [34]	4 weeks		BF vs. FF BF infants slept less at night than FF infants. $F(1,39)$ = 4.925, p < 0.05			ANOVA-two-way analysis of variance	3
Quillin et al., 2004 [35]	4 weeks		BF vs. FF mean ± SD (h) 6.4 ±1.0 vs. 6.4 ± 0.8, p > 0.05			*t*-test	4
Rudzik et al., 2018 [38]	4,6,8,10,12,14,16, 18 weeks	EBF vs. FF Actigraph report No difference between grps for NTS at 2, 6, 8, 10, 12, 14, 16,				*t*-test	3

24 h Sleep Duration							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
		EBF vs FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
		18 weeks, $p > 0.05$					
Yoshida et al., 2015 [33]	13, 17 weeks	EBF vs. FF STN (6 h criterion): 33% vs. 67%				Multiple linear regression	5
Pennestri et al., 2018 [40]	26, 52 weeks		BF +/− food vs. FF +/− food BF infants less likely to STN at 26 weeks ($\chi^2 = 26.67$, $p < 0.0001$) using 6 h criterion BF infants less likely to STN at 6 months ($\chi^2 = 31.19$, $p < 0.0001$) using 8 h criterion	BF +/− food vs. FF +/− food BF infants less likely to STN at 52 weeks ($\chi^2 = 34.96$, $p < 0.0001$) using 6 h criterion BF infants less likely to STN at 12 months ($\chi^2 = 25.24$, $p < 0.0001$) using 8 h criterion		Chi-squared	4
DeLeon et al., 2007 [25]	39 weeks			BF +/− food vs. FF +/− food BF −ve correlated with total NTS ($r = −0.42$, $p < 0.01$)		Pearson's correlation coefficient	4
Huang et al., 2016 [36]	0–34 weeks				BF +/− food vs. FF +/− food No assoc.	Multilevel mixed models	4

24 h Sleep Duration							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
		EBF vs FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
					between NTS %, $p > 0.05$		
Mindell et al., 2012 [17]	13–52 weeks [4]				BF +/− food vs. FF +/− food mean ± SD (h) 10.70 ± 1.03 vs. 10.30 ± 1.31, $p = 0.146$	MANCOVA	6
Night-Waking Frequency							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
		EBF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
Berger et al., 2017 [32]	16 weeks		BF vs. FF No difference in no. of NW, $p > 0.05$			*t*-test	6
Butte et al., 1992 [41]	17 weeks		BF vs. FF mean ± SD (no.) 2.9 ± 1.8 vs. 2.7 ± 2.0, $p > 0.05$			*t*-test Regression	5
Figueiredo et al., 2017 [28]	2, 13, 26 weeks	EBF vs. FF mean ± SD (no.) 2 weeks 3.02 ± 0.83 vs. 2.96 ±	BF vs. FF mean ± SD (no.) 2 weeks 2.63 ± 0.67 vs. 2.96 ± 0.88, $p > 0.05$			Multivariate Analyses of Chi MANCOVA [3]	5

24 h Sleep Duration							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
		EBF vs FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
		0.88, $p > 0.05$ 13 weeks 2.19 ± 1.07 vs. 1.65 ± 1.17, $p > 0.05$ 26 weeks 2.22 ± 1.01 vs. 1.53 ± 0.90, $p < 0.01$	13 weeks 2.18 ± 1.36 vs. 1.65 ± 1.17, $p > 0.05$ 26 weeks 1.73 ± 0.94 vs. 1.53 ± 0.90, $p > 0.05$				
Kaley et al., 2012 [26]	4–10 weeks		BF vs. FF BF woke more freq. than FF, $p < 0.05$			Correlation ANOVA	4
Quillin et al., 1997 [34]	4 weeks		BF vs. FF BF infants had more awakenings $F(1,39) = 12.231$, $p < 0.01$			ANOVA-two-way analysis of variance	3
Quillin et al., 2004 [35]	4 weeks		BF vs. FF Mean ± SD (no.) [8] 2.2 ± 0.8 vs. 2.0 ± 0.9, $p > 0.05$			*t*-test	4
Rudzik et al., 2018 [38]	4, 6, 8, 10, 12, 14, 16, 18 weeks	EBF vs. FF Actigraphy report EBF has 2.1 less NW at 16 weeks, $p = 0.05$ No				*t*-test	3

24 h Sleep Duration							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
		EBF vs FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
		difference between grps for number of NW at 4, 6, 8, 10, 12, 14, 18 weeks					
Tikotzky et al., 2011 [39]	26 weeks	EBF vs. FF EBF assoc. with more NW (Actigraph) (r = 0.32, $p < 0.05$)				Spearman rho correlations	6
Tikotzky et al., 2015 [37]	26 weeks	EBF vs. FF Mean ± SD (no.) [9] 2.53 ± 1.08 vs. 1.48 ± 0.96, $p < 0.05$				Spearman CC	5
Wailoo et al., 1990 [31]	13–17 weeks		BF vs. FF No difference in no. of NW, $p > 0.05$			*t*-test	2
Brown et al., 2015 [19]	26–52 weeks			BF +/− food vs. FF +/− food No difference in total NW F(1711) = 0.931, $p = 0.335$		MANOVA [10]	5

24 h Sleep Duration							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
		EBF vs FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
DeLeon et al., 2007 [25]	39 weeks			BF +/− food vs. FF +/− food BF +ve correlated with NW frequency (r = 0.48, $p < 0.01$)		Pearson's correlation coefficient	4
Huang et al., 2016 [36]	0–34 weeks				BF +/− food vs. FF +/− food BF no diff as compared to FF for NW, $p = 0.0700$	Multilevel mixed models	4
Mindell et al., 2012 [17]	13–52 weeks [4]				BF +/− food vs. FF +/− food mean ± SD (no.) 1.63 ± 1.24 vs. 0.94 ± 0.87, $p = 0.003$	MANCOVA	6
Sun et al., 2018 [27]	8–52 weeks				BF +/− food vs. FF +/− food Freq. NW assoc. with BF (v = 0.18, $p = 0.002$)	Chi-squared *t*-test	
Duration of Night Wakings							
Author, Year	**Infant Age at Assessment/ Assessment**	**≤6 Months**		**>6 Months**	**0–12**	**Statistics [1]**	**Quality Rating**

24 h Sleep Duration							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
		EBF vs FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
	Frequency				Months		
		EBF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
Figueiredo et al., 2017 [28]	2, 13, 26 weeks	EBF vs. FF mean ± SD (h) 2 weeks 3.87 ± 1.13 vs. 4.38 ± 1.18, p > 0.05 13 weeks 3.03 ± 1.16 vs. 3.05 ± 1.20, p > 0.05 26 weeks 2.86 ± 1.01 vs. 2.87 ± 1.12, p > 0.05	BF vs. FF mean ± SD (h) 2 weeks 4.00 ± 1.11 vs. 4.38 ± 1.18, p > 0.05 13 weeks 3.00 ± 1.16 vs. 3.05 ± 1.20, p > 0.05 26 weeks 2.14 ± 0.90 vs. 2.87 ± 1.12, p > 0.05			Multivariate analyses of Chi MANCOVA [3]	5
Yoshida et al., 2015 [33]	13, 17 weeks	EBF vs. FF EBF +ve correlated with wake time at night, p < 0.01				Multiple linear regression	5
DeLeon et al., 2007 [25] [39]	39 weeks	[23][41][26][28]		BF +/− food vs. FF +/− food BF +ve correlated with duration of NW (r =		Pearson's correlation coefficient	4

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ration in tudy [28]. pared to pared to nificantly formula-fed infants [32].

Among infants older than 6 months, 24 h sleep duration did not differ between breastfed and formula-fed infants in one study [23], whilst two other studies reported significantly shorter sleep duration in breastfed infants compared to formula-fed infants [42][30].

Breastfeeding was associated with significantly shorter sleep duration compared to formula feeding in a study that examined infants 0 to 8 months-of-age [36].

24 h Sleep Duration							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
		EBF vs FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
	[28][38]			0.33, $p < 0.05$)			
Longest Sleep Period					[33]		
Author, Year	Infant Age at Assessment/ Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
	[32]	EBF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]	[26][35][28]	
Figueiredo et al., 2017 [28]	2, 13, 26 weeks [25][40] [17] [36]	EBF vs. FF mean ± SD (h) 2 weeks 3.04 ± 1.00 vs. 2.82 ± 0.90, $p > 0.05$ 13 weeks 5.26 ± 2.15 vs. 6.50 ± 2.44, $p < 0.05$ 26 weeks 5.38 ± 2.45 vs. 6.76 ± 1.96, $p < 0.05$ [28][37][39]	BF vs. FF mean ± SD (h) 2 weeks 3.38 ± 1.12 vs. 2.82 ± 0.90, $p > 0.05$ 13 weeks 5.74 ± 2.31 vs. 6.50 ± 2.44, $p > 0.05$ 26 weeks [28][38] 6.98 ± 2.58 vs. 6.76 ± 1.96, $p > 0.05$ [41][35][31][32][28]			Multivariate analyses of Chi MANCOVA [3]	5
Lee et al., 2000 [29]	2–17 weeks	EBF vs. FF mean ± SD (min) [11] 239.9 ± 102.7 vs. 274.1 ± 105.3, $p < 0.01$ [19]	[25]		[26][34]	Unpaired *t*-test	4
Rudzik et al., 2018	4, 6, 8, 10, 12, 14, 16, 18 weeks [36]	EBF vs. FF [17]	[27]			*t*-test	3

2.1.4. Duration of Night Wakings

Among infants aged 6 months and younger, no difference was reported in duration of night wakings between exclusively breastfed and formula-fed infants in one study [28]. However, another study reported a significantly longer duration of night wakings in exclusively breastfed infants compared to formula-fed infants [33].

24 h Sleep Duration							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
		EBF vs FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
[38] [38]		Actigraph report EBF has 55 min longer LSP at 18 weeks, p = 0.04 [38] No difference between grps for LSP at 4, 6, 8, 10, 12, 14, 16 weeks			[29][28] [28]	[28]	[31]
Wailoo et al., 1990 [31]	13–17 weeks		BF vs. FF BF infants more likely to disturb parents within 4 h (χ^2 = 5.9, DF 3, p < 0.01) [28]			*t*-test	2
Huang et al., 2016 [36]	0–34 weeks			[28]	BF +/− food vs. FF +/− food No assoc. between LSP p > 0.05	Multilevel mixed models	4
Mindell et al., 2012 [17]	13–52 weeks [4]				BF +/− food vs. FF +/− food mean ± SD (h) 7.06 ± 2.73 vs. 7.85 ± 2.75, p = 0.249	MANCOVA	6

2.2.1. 24 h Sleep Duration

Three studies reported the relationship between the timing of introduction to complementary foods and 24 h sleep duration. No difference was reported in 24 h sleep duration assessed at six [23] and nine [42][30] months-of-age among infants introduced to complementary foods at ≤12 weeks (around 3 months) compared to at >12 weeks-of-age, at <4 months compared to at ≥4 months-of-age, and at <26 weeks (at 6 months) compared to at ≥26 weeks-

24 h Sleep Duration							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months [23]	Statistics [1]	Quality Rating [2]
		EBF vs FF [1] [42][30]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
Sleep Onset Latency							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
		EBF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
Butte et al., 1992 [41]	17 weeks		BF vs. FF EEG: mean ± SD (min) 34.3 ± 41.6 vs. 4.0 ± 12.6, $p < 0.05$			*t*-test Regression	5
Figueiredo et al., 2017 [28]	2, 13, 26 weeks [19] [17][41][34][35][27][32][37][38][39][33] [19][23][41][25][26][29][35][28][36][37][40][42][33][30] [34][31][38] [34][38]	EBF vs. FF mean ± SD (h) 2 weeks 0.33 ± 0.31 vs. 0.48 ± 0.40, $p > 0.05$ 13 weeks 0.42 ± 0.45 vs. 0.42 ± 0.52, $p > 0.05$ 26 weeks 0.39 ± 0.35 vs. 0.57 ± 0.72, $p > 0.05$ [31]	BF vs. FF mean ± SD (h) 2 weeks 0.56 ± 0.75 vs. 0.48 ± 0.40, $p > 0.05$ 13 weeks 0.44 ± 0.41 vs. 0.42 ± 0.52, $p > 0.05$ 26 weeks 0.51 ± 0.31 vs. 0.57 ± 0.72, $p > 0.05$ [31]	[31]	[17][27][32][39]	Multivariate analyses of Chi MANCOVA [3] [34][31][38]	5 [38]
Tikotzky et al., 2011 [39]	26 weeks	EBF vs. FF EBF assoc. with later sleep onset (r =				Spearman rho correlations	6

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formula-fed infants, though this association was not found in breastfed infants (partial or predominantly breastfed). The majority of the studies reported no difference in night-time sleep duration and total 24 h sleep duration in both exclusively breastfed and breastfed infants (≤6 months-of-age) compared to formula-fed infants. However, after 6 months-of-age, most studies reported breastfed infants to sleep less than formula-fed infants. Though studies were limited, the majority observed no association on the timing of introduction to complementary foods and total 24 h sleep duration, including one study that compared infants who were introduced complementary foods before and after 6 months-of-age in accordance with the WHO recommendations.

24 h Sleep Duration							
Author, Year	Infant Age at Assessment/Assessment Frequency	≤6 Months		>6 Months	0–12 Months	Statistics [1]	Quality Rating [2]
		EBF vs FF [1]	BF vs. FF [1]	BF vs. FF [1]	BF vs. FF [1]		
		0.32, $p < 0.05$)					
Mindell et al., 2012 [17]	13–52 weeks [4]				BF +/− food vs. FF +/− food mean ± SD (h) 0.23 ± 0.15 vs. 0.30 ± 0.53, $p = 0.427$	MANCOVA	6

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