

Knowledge and Practice of Suitable Breastfeeding and Infant Carrying Positions among Nigerian Nursing Mothers

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Abstract

Background: Breastfeeding and infant carrying tasks are usually associated with posture-related musculoskeletal disorders. This study investigated the knowledge and practice of suitable breastfeeding (BF) and infant carrying (IF) positions among Nigerian nursing mothers. **Methods:** Three hundred and fifty consenting nursing mothers participated in this cross-sectional survey, yielding a response rate of 97.2%. A pre-tested self-administered questionnaire that sought information on maternal socio-demographic variables, knowledge and practice of BF and IC positions was employed in the study. Data was analyzed using descriptive statistics and inferential statistics of Chi square and logistic regression. **Results:** A majority (72%) of the respondents had poor knowledge of breastfeeding positions while 18.3% had poor knowledge of infant carrying positions. Common features of BF practices among the respondents include neck and trunk forward lean (76.3%), twisted spine (70.3%), scissors hold of the breast (67.4%), and sitting on stools or edges of the beds without back support (52.6%). Trunk forward lean (42%) and positioning the infant-load with a wrap on the upper back (32.3%) were commonly identified features of appropriate IC postures. Majority of the respondents (67.7%) practiced non-advisable BF positions compared with IC positions (30.6%). There was significant association between knowledge of BF positions and BF position practices ($X^2 = 13.021$; $p = 0.001$). Respondents with good knowledge of BF positions have 0.5 less chance of involvement in non-advisable BF practices. **Conclusion:** Nigerian nursing mothers have poor practice and knowledge of appropriate breastfeeding positions. However, Nigerian mothers have good knowledge of appropriate infant carrying positions, as well as advisable infant carrying practices. Knowledge of breastfeeding positions is significant determinant of breastfeeding position practice among the population.

Key words: Knowledge, Attitude, Breastfeeding postures, Infant carrying postures, Nursing mothers

Introduction

Breastfeeding (BF) and infant carrying (IC) are major child care related activities that are widely practiced by nursing mothers. Both practices are the most common and physically demanding child care tasks [1,2]. BF is the normal method to provide

infants with the nutrients they need for healthy growth and development [3]. There are evidences of numerous benefits of BF for the mother and infant [4-6]. All mothers, regardless of feeding intention, are encouraged to make themselves as comfortable as possible from birth [7]. Several

breastfeeding postures including sitting upright, semi-reclined, side lying or flat lying have been recommended [7-9]. Generally, these postures are associated with known benefits including maintenance of a **neutral spine, reduction of fatigue and prevention of musculoskeletal injuries [8,10-12]**.

On the other hand, IC, which is the act of carrying an infant close to the caregiver's body with special devices for the accomplishment of attachment parenting [13,14] has been associated with various maternal and infant benefits [15-17]. Most importantly, Schoon and Silven [18] posit that IC increases physical contact between mother and infant and promotes breastfeeding practices. Different methods of IC, especially those requiring trunk loading are in existence and have been widely utilized by nursing mothers [18,19]. IC is the most common and costly forms of infant care for the mothers second only to lactation [1,2]. Various IC methods have been associated with biomechanical [19-23] and energetic costs [1,2] on the mother, implying their increased possibilities of causing injuries. Consequently, appropriate positioning and use of carrying devices for infant carrying have been recommended [1,19,23].

Some authors have reported incidences of awkward BF and IC postures among nursing mothers [24-28]. Anecdotal observations affirm complaints of musculoskeletal discomforts resulting from BF and IC practices among Nigerian nursing mothers. Some previous studies have attributed musculoskeletal discomforts in BF mothers with faulty posture during BF [29,28]. Thus, Mbada et al. [27] found that mothers' poor knowledge and negative attitude towards adoption of appropriate postures was associated with inappropriate BF practices.

Literature is replete on recommendations on appropriate postures during infant-related activities, such as BF [28,30-32] and IC [13,14,16].

However, there is still paucity of studies on BF postures [27,28] and apparently none on IC among Nigerian nursing mothers. Considering, that proper knowledge and practices of appropriate BF and IC positions are vital for the prevention of related musculoskeletal disorders, this study was aimed to assess knowledge and practice of appropriate BF and IC postures among Nigerian nursing mothers. the authors hypothesized that knowledge of BF and IC postures will be significantly associated with BF and IC practices.

Materials and Methods

350 nursing mothers who were recruited from the post-natal and paediatrics clinics of eight hospitals in Enugu, South-Eastern, Nigeria, participated in this cross-sectional survey. Ethical approval was obtained from the University Of Nigeria health research ethics committee. All the respondents gave signed informed consent prior to participation.

A 22-item self-administered questionnaire, consisting of three sections was used for data collection. Section A was on socio-demographic characteristics while section B assessed respondents' knowledge of the features and benefits of suitable BF and IC postures. Section C assessed the most usual BF and IC postures adopted by the respondents. 12 and 10 questions were used to assess respondents' knowledge of suitable BF and IC postures, respectively, with one point assigned to each correct answer. Knowledge of the benefits of suitable BF and IC postures was rated on a likert scale of 1 to 3. A pictorial assessment of BF postures was also included in the questionnaire.

In a pilot study, the face validity of the questionnaire was determined by expert review. Using a test-retest method, the reliability of the questionnaire was tested. The copies of the questionnaire were first administered to 20 nursing mothers and were re-administered after

7 days. For effective communication purposes, the questionnaire was translated into Igbo language and back-translated into the original language (English). The reliability of the Igbo version was also assessed in a pilot study by a test-retest method among 25 nursing mothers, observing 7 days between test and re-test. Test-retest reliability of the English and Igbo versions of the questionnaire yielded correlation coefficients of $r = 0.958$ ($p = 0.001$) and $r = 0.79$ ($p = 0.001$).

Data analyses

Data were summarized using descriptive statistics of mean, standard deviation, frequency and percentages. Knowledge of BF positions was rated on a scale of 1-12, with ≥ 6 points denoting good knowledge and < 6 points for poor knowledge. On a scale of 1-10, knowledge of IC positions was dichotomized into two categories, ≥ 5 points and < 5 points representing good and poor knowledge, respectively. For the BF and IC position-practices, respondents who adopted more than one unsuitable BF and IC position or posture were categorized into the non-advisable practice group.

Univariate (chi square test) and multivariate (logistic regression) analysis were used to test the associations between maternal characteristics and each of knowledge and attitude of BF and IC postures. The α level of statistical significance was set as $p < 0.05$. Statistical Package for Social Sciences (SPSS) software (version 16) was used to analyze data.

Results

A total of 362 questionnaires were distributed, after which 350 questionnaires were returned and found valid for analysis, yielding a response rate of 97.2%. The mean age of the respondents was 28.1 ± 5.08 . The maternal and socio-demographic characteristics are presented in Table 1.

Table 2 shows the frequency distribution results of respondents who have knowledge of the appropriate features of BF postures. Majority of the mothers had poor knowledge of BF positions (72%). Inappropriate postures, including bending the neck forward to enable closer reach of the infant, twisting the back to enable a closer reach of the infant, using scissors hold for breast support and compressions, and sitting on a mat, stool or edge of a bed without back support during breastfeeding were identified as the suitable BF postures by most of the respondents.

The frequency distribution results of respondents who have knowledge of the appropriate features of IC postures are presented in table 3. 18.3% of the mothers had poor knowledge of IC positions. Leaning forward while carrying the infant on the back and carrying infant with support on the upper back were identified as the suitable IC postures by most of the respondents. The respondents had more knowledge of the unsuitable IC postures than the suitable postures. More than half of the respondents (52.3%) reported gaining knowledge on BF and IC postures from antenatal and postnatal clinics.

Knowledge of the benefits of adopting suitable BF and IC postures among the respondents are presented on table 4. Majority of the mothers agreed that adoption of appropriate breastfeeding and baby carrying postures, will enable infant comfort, better infant feeding, maternal comfort and improved stability and balance while walking.

Table 5 shows the BF posture and position practices of the respondents as well as the reasons for their BF practices. 67.7% of the respondents practiced non-advisable breastfeeding positioning. Majority reported sitting on a chair without foot and back support, sitting in bed without back support and breastfeeding with a flexed trunk to enable closer reach to the infant as the most common breastfeeding postures and position.

Infant comfort, maternal comfort and maternal convenience were the most common reasons for the respondents' BF practices.

The common trunk and upper limb orientations adopted during infant carrying practices are shown in table 6. 69.4% practiced advisable infant carrying positioning. Carrying an infant on the back was the most commonly adopted infant carrying position. Majority of the mothers reported the maintenance of a straight spine during infant carrying. Maternal comfort and lack of knowledge of better positions were the most common reasons for infant carrying practices.

Tables 7 shows the Chi square test of association between maternal characteristics and each of knowledge of BF and IC postures. There were no significant associations between maternal characteristics and knowledge of IC postures. However, respondents' educational level was significantly associated with knowledge of BF postures. Respondents with higher educational levels had 0.5 less chance of practicing non-advisable BF positions. On table 8, the Chi square test of association between maternal characteristics and each of BF and IC position-practices was presented. There were no significant associations between maternal characteristics and knowledge of IC postures. Respondents' educational level and knowledge of breastfeeding postures were significantly associated with BF position-practices of the respondents. Respondents with higher educational level had 0.4 less chance of practicing non-advisable BF positions while respondents with good knowledge of BF postures had 0.5 less chance of practicing non-advisable BF positions.

Furthermore, 323 mothers (92.3%) of mothers perceived that it was necessary to adopt appropriate breastfeeding and infant carrying postures while only 87 of them (24.9%) agreed that infant weight should be an important factor to consider while making choices of breastfeeding

and infant carrying positions. Majority of the respondents (74.3%) opined that mothers are not adequately educated on the features and health implications of appropriate BF postures while 25.7% of the respondents opined that mothers are not adequately educated on the features and health implications of appropriate IC postures.

Table 1: Table showing maternal and socio-demographic characteristics of participants (N=350)

Variable	Frequency	Percentage (%)
Age(years)		
< 30	195	55.7
≥ 30	155	44.3
Religion		
Christianity	347	99.1
Islam	2	.6
Traditional	1	.3
Education		
≤ O' level	205	58.6
> O' level	145	41.4
Marital Status		
Single	10	2.9
Married	340	97.1
Residence		
Rural	49	14.0
Urban	301	86.0
Parity		
Primiparous	231	66
Multiparous	119	34
Attendance of antenatal class		
Yes	330	94.3
No	20	5.7
Attendance of postnatal class		
Yes	270	77.1
No	80	22.9

Table 2: Knowledge of suitable breastfeeding postures and positions among the participants

Variable	Frequency	Percentage
Features of breastfeeding postures and positions		
It is suitable to:		
Keeping the back upright in the sitting position	94	26.9
Support the low back with a small pillow or cloth	97	27.7
Breastfeed from a side lying position	153	43.7
Lift the infant with a pillow/cloth to enable closer contact with the breast	100	28.6
Place the feet on a stool to position the bended knees slightly higher than the hip	155	44.3
Breastfeed in a laid-back position	32	9.1
It is unsuitable to:		
Slouch by flexing the neck and upper back to enable a closer reach of the infant	83	23.7
Twist the back to enable a closer reach of the infant	104	29.7
Sit on mats, stools or edges of a bed without back support	166	47.4
Cross the legs or place one ankle across the opposite knee	228	65.1
Use the scissors hold for breast support and compressions	114	32.6
Overall Knowledge score		
Good	98	28
Poor	252	72

Table 3: Knowledge of infant carrying postures among the participants

Variable	Yes n(%)	Non(%)
Features of infant carrying postures and positions		
It is suitable to:		
Carry an infant with support on the upper back	113	32.3
Use infant carriers with thick padded shoulders	54	15.4
Adjust the height of baby stroller handles to keep the wrist straight	12	3.4
Adjust the height of baby strollers to keep the back Straight	11	3.1
It is unsuitable to:		
Lean forward while carrying an infant on the back	203	58.0
Lean backward while carrying an infant on the back	319	91.1
Lean forward while carrying an infant with an infant carrier in front	307	87.7
Lean backward while carrying an infant with an infant carrier in front	327	93.4
Carry an infant with support on the lower back	269	76.9
Use one hand to carry the baby in a portable car seat	337	96.3
Overall Knowledge score		
Good	286	81.7
Poor	64	18.3

Table 4: Knowledge of benefits of suitable breastfeeding and baby carrying postures among the respondents (N=350)

Variable	Agree (n)%	Indifferent (n)%	Disagree (n)%
Benefits			
Maternal comfort	317(90.6)	11(3.1)	68(19.4)
Prevention of upper back injuries and pain	238(68.0)	45 (12.9)	67(19.1)
Prevention of lower back injuries and pain	235(67.1)	44(12.6)	71(20.3)
Prevention of injuries and pain of the neck, shoulder, arm, elbow, wrist and hand	236(67.4)	46(13.1)	68(19.4)
Prevention of injuries and pain of the chest	229(65.4)	46(13.1)	75(21.4)
Prevention of injuries and pain of the thighs, legs, ankles and foot	230(65.7)	46(13.1)	74(21.1)
Improved stability and balance while walking	279(79.7)	26(7.4)	45(12.9)
Infant comfort	330(94.2)	8(2.3)	12(3.4)
Improved infant feeding	327(93.4)	13(3.7)	10(2.9)

Key: A- Agree; I- indifferent; D- disagree

Table 5: Breastfeeding posture and positioning practices of the respondents (N=350)

Variable	Frequency	Percentage
Breastfeeding position		
Sitting on a mat with back support	16	4.6
Sitting on a mat without back support	22	6.3
Sitting in bed with a back support	3	29.4
Sitting in bed without a back support	219	62.6
Lying down on the side with supporting pillows	119	34.0
Lying down on the side without supporting pillows	25	7.1
Sitting on chair with foot and support	114	32.6
Sitting on a chair without foot and back support	228	65.1
Trunk position during breastfeeding		
Straight spine	88	25.1
Forward flexed	184	52.6
Twisted spine	78	22.3
Overall Breastfeeding posture practice grade		
Advisable	113	32.3
Not advisable	237	67.7
Reason for breastfeeding practices		
Infant comfort	324	92.6
Maternal comfort	322	92.0
Maternal convenience	309	88.9
Lack of knowledge of better positions	248	70.9
Improved infant feeding	311	88.9
Breast size considerations	149	42.6
Enables breast concealment in public	136	38.9
Religious reason	5	1.4
No obvious reason	2	0.6

Table 6: Infant carrying position practices (N=350)

Variable	Frequency	Percentage
Infant carrying position practice		
Advisable	243	69.4
Not advisable	107	30.6
Infant carrying position		
Infant carrying on the back	301	86.0
Infant carrying in front	121	34.6
Infant carrying on the hips	292	83.4
Trunk position during infant carrying		
Upright spine	243	69.4
Backward trunk lean	18	5.1
Forward trunk lean	63	18.0
Lateral trunk lean	8	2.3
Reason for infant carrying practices		
Infant comfort	330	94.3
Maternal comfort	329	94.0
Lack of knowledge of better positions	261	74.6
Religious reasons	4	1.1
Reduced infant crying	225	64.3
Provides space for other daily activities	218	62.3
Body size considerations	66	18.9
No obvious reason	2	0.6

Table 7: Chi square test of association between maternal characteristics and each of knowledge of breastfeeding and infant carrying postures

Variable	Breastfeeding posture N (%)		X ² (p-value)	Infant carrying posture N (%)		X ² (p-value)
	Good (n = 98)	Poor (n = 252)		Good (n=286)	Poor (n=64)	
Age			0.388 (0.533)			0.140 (0.709)
< 30	52 (53.1)	143 (56.7)		158 (55.2)	37 (57.8)	
≥ 30	46 (46.9)	109 (43.3)		128 (44.8)	27 (42.2)	
Place of residence			0.612 (0.434)			0.146 (0.702)
Urban	82 (83.7)	219 (86.9)		245 (85.7)	56 (87.5)	
Rural	16 (16.3)	33 (13.1)		41 (14.3)	8 (12.5)	
Religion			3.350 (0.187)			0.677 (0.713)
Christianity	97 (98.9)	250 (99.2)		283 (99.0)	64 (100)	
Islam	0 (0)	2 (0.8)		2 (0.7)	0 (0)	
Traditional	1 (0.1)	0 (0)		1 (0.3)	0 (0)	
Education			7.590 (0.006)* OR = 0.480 CI = 0.288-0.801			3.344 (0.067)
≤ O' level	46 (46.9)	159 (63.1)		161 (56.3)	44 (68.8)	
> O' level	52 (53.1)	93 (36.9)		125 (43.7)	20 (31.3)	
Marital status			0.735 (0.391)			0.020 (0.887)
Single	4 (4.1)	6 (2.4)		8 (2.8)	2 (3.1)	
Married	94 (95.9)	246 (97.6)		278 (97.2)	62 (96.9)	

Variable	Breastfeeding posture N (%)		X ² (p-value)	Infant carrying posture N (%)		X ² (p-value)
	Good (n = 98)	Poor (n = 252)		Good (n=286)	Poor (n=64)	
Parity						
Primiparous	71 (72.4)	160 (63.5)	2.523 (0.112)	189 (66.1)	42 (65.6)	0.005 (0.944)
Multiparous	27 (27.6)	92 (36.5)		97 (33.9)	22 (34.4)	
Antenatal classes			0.042 (0.837)			1.948 (0.163)
Yes	92 (93.9)	238 (94.4)		272 (95.1)	58 (90.6)	
No	6 (6.1)	14 (5.6)		14 (4.9)	6 (9.4)	
Postnatal classes			1.701 (0.192)			3.129 (0.077)
Yes	71 (72.4)	199 (78.9)		226 (79.0)	44 (68.8)	
No	27 (27.6)	53 (21.0)		60 (21.0)	20 (31.3)	

*indicates significance at p<0.05

Table 8: Chi square test of association between maternal characteristics and each of breastfeeding and infant carrying position-practice

Variable	Breastfeeding position-practice		X ² (p-value)	Infant carrying position practice		X ² (p-value)
	Advisable (n = 113)	Not advisable (n = 237)		Advisable (n = 243)	Not advisable (n = 107)	
Age						
< 30	60 (53.1)	135 (57.0)	0.463 (0.496)	130 (53.5)	65 (60.7)	1.582 (0.208)
≥ 30	53 (46.9)	102 (43.0)		113 (46.5)	42 (39.3)	
Place of residence			0.863 (0.353)			1.771 (0.183)
Urban	100 (88.5)	201 (84.8)		205 (84.4)	96 (89.7)	
Rural	13 (11.5)	36 (15.2)		38 (15.6)	11 (10.3)	
Religion				1.443 (0.486)		
Christianity	113 (100)	234 (98.7)		241 (99.2)	106 (99.1)	
Islam	0 (0)	2 (0.8)		2 (0.8)	0 (0)	
Traditional	0 (0)	1 (0.4)		0 (0)	1 (0.9)	
Education			21.945 (0.000)* OR = 0.347 CI = 0.204-0.591			
≤ O' level	46 (40.7)	159 (67.1)		147 (60.5)	58 (54.2)	58 (54.2)
> O' level	67 (59.3)	78 (32.9)		96 (39.5)	49 (45.8)	
Marital status			1.478 (0.224)			1.831 (0.176)
Single	5 (4.4)	5 (2.1)		5 (2.1)	5 (4.7)	
Married	108 (95.6)	232 (97.9)		238 (97.9)	102 (95.3)	
Parity			0.681 (0.409)			0.340 (0.560)
Primiparous	78 (69.0)	153 (64.6)		158 (65.0)	73 (68.2)	
Multiparous	35 (31.0)	84 (35.4)		85 (35)	34 (31.8)	
Antenatal classes			0.515 (0.473)			0.196 (0.658)
Yes	108 (95.6)	222 (93.7)		230 (94.7)	100 (93.5)	
No	5 (4.4)	15 (6.3)		13 (5.3)	7 (6.5)	
Postnatal classes			2.823 (0.093)			3.268 (0.071)
Yes	81 (71.7)	189 (79.7)		194 (79.8)	76 (71)	
No	32 (28.3)	48 (20.3)		49 (20.2)	31 (29)	
Knowledge of BF or IC positions (where applicable)			41.692 (0.000)* OR = 0.488 CI = 2.651-7.598			0.029 (0.865)
Good	57 (50.4)	41 (17.3)		198 (81.5)	88 (82.2)	
Poor	56 (49.6)	196 (82.7)		45 (18.5)	19 (17.8)	

*indicates significance at p<0.05

Discussion

This study assessed the knowledge and practice of appropriate BF and IC postures among nursing mothers. From this study, a majority of Nigerian nursing mothers had poor knowledge of BF positions but good knowledge of IC positions. The observed poor knowledge of BF positions is inconsistent with a previous report from Nigeria that showed good knowledge of appropriate BF practices among 71.3% of nursing mothers attending selected baby-friendly facilities in south western Nigeria [27]. Their findings revealed that older women and multiparae had higher knowledge about the prevention of musculoskeletal pain arising from awkward BF postures and may also have developed better coping strategies, adopting correct postures than the younger ones. However, their study was limited by the fact that they did not further assess mothers' knowledge of the features comprising appropriate BF positions. In addition to the responses of the women in the present study, their knowledge of relative features and benefits of appropriate BF and IC positions were further assessed.

This study's findings revealed that majority of the women predominantly identified bending the neck forward to enable closer reach to the infant, twisting the back to enable a closer reach to the infant, using scissors hold for breast support and compressions and sitting on a mat, stool or edge of bed without back support as features of suitable BF positions. Contrary to the good knowledge of IC positions among the mothers, leaning forward while carrying the infant on the back was the most commonly identified feature of suitable IC position. However, most of these identified features are atypical of appropriate body postures and do not provide neutral spine positions during child-care activities. Alterations of the spinal curvature during activities could increase the likelihood of muscle fatigue and shortening of the agonist

muscles while resulting in inadequate contractility of the antagonist. Altered spinal posture has been associated with musculoskeletal discomforts and increased risk of injuries [33]. Relative to BF positions, Roberts [9] posited that "the scissors hold for breast compression during breastfeeding places undue stress on the wrist extensor tendons (potentially flexor tendons), predisposing the wrists and fingers to biomechanical disadvantage". This disadvantage was attributed to the fact that "in this position, the wrist is in a sustained awkward position as the fingers perform a repetitive, forceful pinch and grasp". In essence majority of the mothers were unable to identify the suitable features of recommended BF and IC positions. These findings identify major deficiencies in women's health education and promotion in Nigeria. Meanwhile, knowledge on child-care postures was largely obtained from antenatal and postnatal clinics, as reported by the mothers. This indicates the availability of health promotion programmes as it relates the ergonomics of child care tasks in maternal clinics. However, this study did not seek information on the specific health personnel who were responsible for such education in the maternal clinics. Such information would have gone a long way in assessing the participation of women's health physiotherapist in the promotion of musculoskeletal health during the child bearing years as they are in the best position to provide such knowledge. Daily encounters in most maternal clinics have revealed that most maternal musculoskeletal health education programmes are conducted by some other health personnel rather than physiotherapists. As a result, there is a possibility that these teachings may lack adequate composure of recommended postures which will be appropriate for musculoskeletal injury prevention.

Meanwhile, knowledge on child-care postures was largely obtained from antenatal and postnatal clinics, as reported by the mothers. This indicates

the availability of health promotion programmes as it relates the ergonomics of child care tasks in maternal clinics. However, this study did not seek information on the specific health personnel who were responsible for such education in the maternal clinics. Such information would have gone a long way in assessing the participation of women's health physiotherapist in the promotion of musculoskeletal health during the child bearing years. Ordinarily, physiotherapists are equipped with the requisite knowledge on the prevention and management of musculoskeletal injuries. As a result, women's health physiotherapists in conjunction with occupational therapists are in a unique position to teach postpartum women how to incorporate ergonomic principles into childcare activities for improved musculoskeletal health.

Relative to the knowledge of the benefits associated with the utilization of appropriate BF and IC postures among the mothers, findings from the study showed that majority of the mothers reported infant and maternal comfort, improved infant sucking during breastfeeding and improved stability and/or balance during locomotion, as the benefits of appropriate breastfeeding and baby carrying postures. It is interesting to note that mothers' knowledge of such associated benefits revolved around maternal and infant comfort with no considerations of the associated health benefits associated. This implies that mothers may adopt any position, provided it offers maternal and infant comfort and/or convenience. This concurs with the mothers' reported reasons for breastfeeding and infant-position practices which was predominantly based on maternal and infant comfort. Mbada et al. [28] opined that a comfortable body position may not be the most appropriate for the integrity of the musculoskeletal system. Thus, re-education of the mothers is highly recommended.

The results showed that majority of the mothers adopted non-advisable BF positions and postures.

Sitting on a chair without foot and back support, sitting in bed without back support and forward trunk lean during BF were the most commonly adopted BF positions and postures. Concurrently, previous studies [24,25,27] had reported negative BF and IC practices among mothers, including BF while sitting on the edges of beds. Sitting on edge of the bed or chair without support offers no back support, leading to over activity of the trunk muscles and have been implicated in the etiology of back pain [34,27]. Inappropriate posture during BF has been implicated as a predisposing factor of musculoskeletal pain among mothers in previous studies [29,35]. Considering that BF is a frequent child-care task requiring long durations, prolonged adoption of awkward postures and positions during this task will have adverse health benefits on the mother. Mbada et al. [27] opined that inappropriate postures for prolonged time, as it is the case in BF, could lead to end range loading of periarticular structures and result in mechanical deformation of normal tissues. Meanwhile, most of the women reported carrying their infants on the back. This is in accordance with the results of a previous study [36] which revealed back carrying as the predominant infant carrying method among Nigerian women. Majority of the mothers also reported maintaining an upright spine posture during their various infant carrying practices. Although this practice contradicts their identification of forward trunk lean as the most common suitable IC posture, it is interesting to note that their IC practices are predominantly advisable. However, this finding needs to be reported with caution as this study did not consider the weight of the infants being carried. Infant weight is linearly associated with the degree of trunk lean during infant carrying as heavier babies will lead to more marked alterations in the posture of the trunk [19,22]. Additionally, the participants' perception of their trunk positions during IC was a subjective

assessment and there is a possibility that an individual carrying a trunk load may not perfectly appreciate changes in spinal posture. Nevertheless, some mothers still reported a forward trunk lean posture during infant carrying.

Obviously, the reported high prevalence of non-advisable child-care practices further re-affirms the deficiency in the knowledge of suitable child-care positions among the mothers. Although some authors [25] have reported high prevalence of child care activity-related musculoskeletal injuries among mothers, despite good knowledge of appropriate performance of child care practices, adequate ergonomics interventions and education on child-care practices is highly recommended. This strategy will likely yield positive outcomes as the study results further showed that majority of the mothers reported having insufficient information on appropriate and recommended postures for childcare tasks and additionally opined that it will be necessary and beneficial to adopt appropriate postures during breastfeeding and infant-carrying tasks.

Furthermore, the results revealed that maternal educational level was significantly associated with BF position knowledge and practice, with mothers possessing higher educational degrees having better knowledge and practice. This suggests a possible linear relationship between educational level and comprehension of teachings as well as adherence to recommended life style practices. Knowledge of BF positions was also associated with BF position practices. This is not surprising instead is in agreement with the opinions of Mbada et al. [27] who stated that mothers' poor knowledge and negative attitude towards breastfeeding may influence practices and constitute barriers to optimizing the benefits of the baby-friendly initiative. However, there is a dearth of related literature on knowledge and practice of BF and IC positions among women in their childbearing age,

thereby limiting discussion of the findings of this study.

Conclusion

Nigerian nursing mothers have poor practice and knowledge of appropriate breastfeeding positions. However, Nigerian mothers have good knowledge of appropriate infant carrying positions, as well as advisable infant carrying practices. Knowledge of breastfeeding positions is significant determinant of breastfeeding position practice among the population. Appropriate and ergonomically-recommended breastfeeding and infant carrying-position practices are insufficient or lacking in the traditional ante-and-post natal settings. It is recommended that education on appropriate posture during breastfeeding and infant carrying may help reduce the risk of child-care related musculoskeletal disorders during the child-bearing years.

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