

# Impact of Breastfeeding on Lactating Women Bone Health: A Survey based Study in Northern Region of Saudi Arabia

Arwa Owayed Alanazi<sup>1</sup>, Vijay R. Chidrawar<sup>2\*</sup>, Bader Alsuwayt<sup>1</sup> and Shruti Shiromwar<sup>2</sup>

<sup>1</sup>Department of Clinical Pharmacy, Northern Border University, Rafha, Kingdom of Saudi Arabia

<sup>2</sup>Department of Pharmacology and Toxicology, Northern Border University, Rafha, Kingdom of Saudi Arabia; vijay\_pharmacology@yhao.com

## Abstract

Bone fitness is considered as an important public health problem especially in post-menopausal women. Numerous studies have investigated to understand beneficiary effects of mother milk on the baby but very few studies have been conducted to understand the effect of breastfeeding on the bone health of lactating women. We hypothesized that high calcium demand during pregnancy and lactation and low estrogenic state support may affect on the bone health immediately after child birth and later in the life. Based upon this theory we have conducted a survey based study in the Northern region of Saudi Arabia to assess the health status of the lactating mothers. Total 376 lactating mothers were interviewed during the period of 16 Nov 2016 to 23 March 2017. A pre-tested and structured questionnaire was provided at their homes to collect information. The result revealed that among 376 participants, 7% complaining about generalized pain, 41% suffering from joint pain, 24%, suffering from lower back pain and 1% of mothers suffered from fracture. This survey highlights important but ignored aspect of the bone health of lactating women in the Northern region of Saudi Arabia. During pregnancy, women consume calcium supplements to satisfy their requirement of developing baby but after child birth, they stop calcium supplement though it's needed. Based upon this study we state that there is a need to prepare and follow guidelines for the use of calcium supplement for the lactating women to maintain bone health.

**Keywords:** Bone Health, Estrogen and Calcium, Lactation, Pregnancy

## 1. Introduction

breastfeeding provides a unique biological and emotional basis for the health and development of the children<sup>1</sup>. Breast milk contains all the nutrients that an infant needs in the first 6 months of life, helps in sensory and cognitive development, and also protects the infants against infectious and chronic diseases<sup>2</sup>. If the mother is consuming a balanced diet comprising of various food groups, she gets the benefit of various nutrients that are necessary and increased during the pregnancy. Although calcium is important mineral throughout lifetime, female's body's demand for calcium is greater during pregnancy and breastfeeding because both the woman and her baby need it. If the mother does not

have adequate dietary calcium preconceptionally and during the pregnancy, significant maternal bone density could be lost, possibly putting her at risk for osteoporosis later in life. Additionally, low calcium intakes could lead to retardation of the fetal skeleton development and low calcium concentrations in breast milk<sup>5</sup>. Due to the growing interest in this topic, many studies have been conducted over the past 10 years regarding bone and mineral metabolism of calcium during pregnancy and lactation. In spite of the Middle East being one of the sunniest regions worldwide, the report found that the prevalence of hypo-vitaminosis D there was among the highest in the world, reaching 80% in adolescent girls in Saudi Arabia<sup>6</sup>. Based upon these observations a survey bases study was conducted in the Northern Region of

\* Author for correspondence

Saudi Arabia and the main objectives of the study was to determine impact of breastfeeding on lactating women bone health and to assess mother knowledge and attitude toward breastfeeding. A pre-tested and structured questionnaire was provided at nursing mothers home to collect information regarding the health status of the lactating women.

## 2. Materials and Methods

### 2.1 Study Area and Population

This study was conducted in a Northern Border Region of Saudi Arabia on convenient sample of 376 lactating women attending at Prince Abdul-Aziz Bin Musaad Hospital Arar Maternity and Pediatric Hospital, from some women at their homes in Arar-Saudi Arabia.

As per policy of our institute no institutional review board approval is required for noninvasive survey-based studies.

### 2.2 Study Design and Data Collection

Cross-sectional Survey-based study was carried out from 16<sup>th</sup> Nov 2016 to 23<sup>rd</sup> March 2017 on a convenient sample of lactating women. Data was collected from paper data collection sheet. Once the participants who meet inclusion criteria are identified, the purpose of the study explained to all of them, and they were informed that their participation in the study is voluntary and their information and responses is confidential. Then all the lactating women who agree to participate were interviewed for data collection, each participant participated in interview for over 15-20 minutes.

### 2.3 Inclusion and Exclusion Criteria

Women were included in the study if they are: Married and currently lactating above 18 years of age, not having chronic diseases like diabetes mellitus, renal or hepatic failure, Lactating women or who stopped breastfeeding in the last 6 months and suffering from joint pain, dull body pain and generalized weakness.

The women excluded from the study were: Younger than 18 years old, women who have stopped breastfeeding for more than 6 months or early, women suffering from chronic disease and women who is dependent on bottled feeding for her child.

### 2.4 Statistical Analysis

After collection of data using the data collection sheets, all data were entered to excel program for statistical analysis and bar graphs were created by using statistical charts in excel 2010.

## 3. Results

### 3.1 Demographic Data of Participated Women

A total of 376 lactating women were included in the study. Their socio-demographic characteristics are presented in Table 1. Majority of them (76%) were in the age group ranged from 20 years to 35 years. Among the participants there were 98% with single birth and only 2% with twin birth. 70% of participants delivered baby with weight ranged from 2 to 4 kilograms. (Figure 1 and Figure 2)

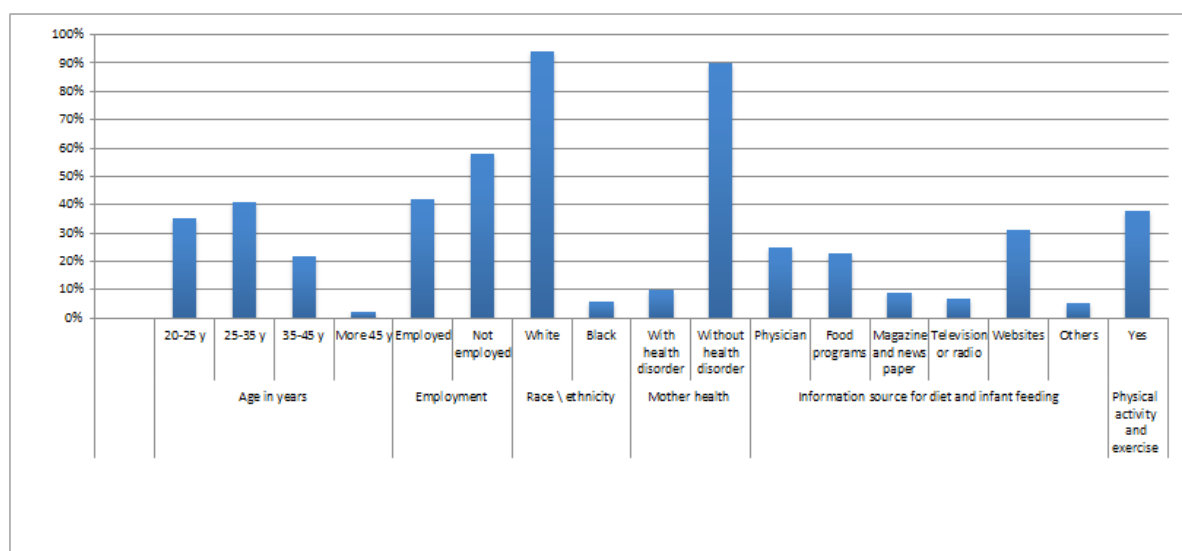


Figure 1. Represent socio-demographic characteristic of participants.

**Table 1.** Represent demographic characteristic of study subjects (N=376)

Variables	Group	Frequency	Percentage (%)
Age in years	20-25 y	133	35%
	25-35 y	153	41%
	35-45 y	81	22%
	More 45 y	9	2%
Employment	Employed	157	42%
	Not employed	219	58%
Race \ Ethnicity	White	354	94%
	Black	22	6%
Mother health	With health disorder	37	10%
	Without health disorder	339	90%
Type of delivery	Normal	217	58%
	Caesarean	159	42%
Delivered baby	Boy	192	51%
	Girl	184	49%
Single or multiple birth	Single	372	98%
	Twin	4	2%
Birth weight	Less than 2 kilogram	106	29%
	2-4 kilograms	265	70%
	More than 4 kilo	5	1%
Baby's family medical history	With health disorder	134	35%
	Without health disorder	242	65%
Current number of delivery	1 <sup>st</sup>	72	19%
	2 <sup>nd</sup>	64	17%
	3 <sup>rd</sup>	76	20%
	4 <sup>th</sup>	84	22%
	5 <sup>th</sup>	39	10%
	More 5 <sup>th</sup>	41	11%
Number of children	None	72	19%
	1 child	64	17%
	2	76	20%
	3	84	22%
	4	39	10%
	5 and more	41	11%
Information source for diet and infant feeding	Physician	91	25%
	Food programs	84	23%
	Magazine and news paper	36	9%
	Television or radio	29	7%
	Websites	117	31%
	Others	19	5%
Physical activity and exercise	Yes	141	38%
	No	235	62%

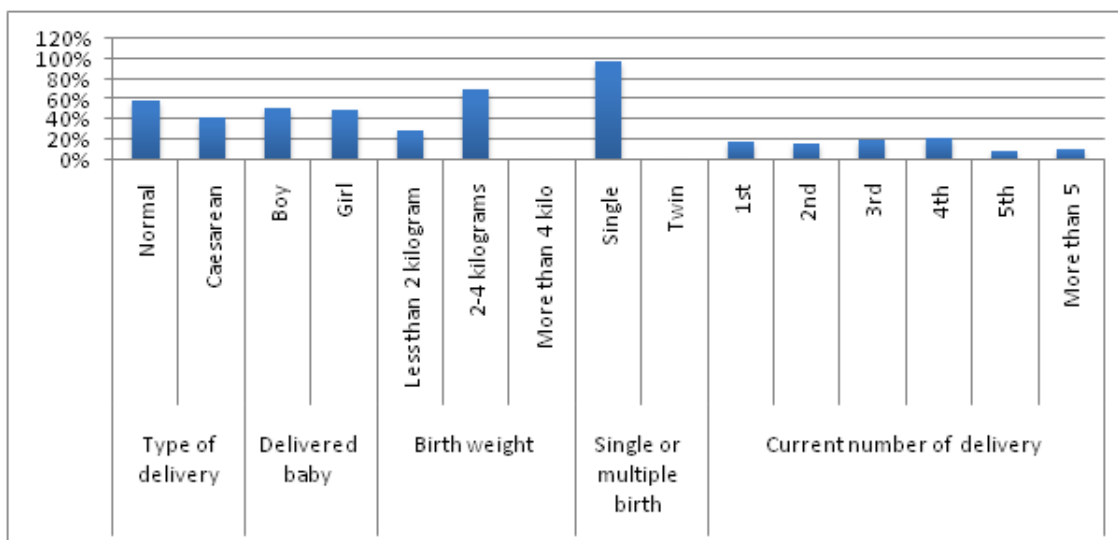


Figure 2. Represent sociodemographic characteristic of participants.

### 3.2 Dietary Changes of Study Subjects during Pregnancy and after Delivery

72% increased their intake of milk and milk products during pregnancy (Table 2) and after delivery, 61% increased their intake of egg.

### 3.3 Breastfeeding Practices among Study Subjects

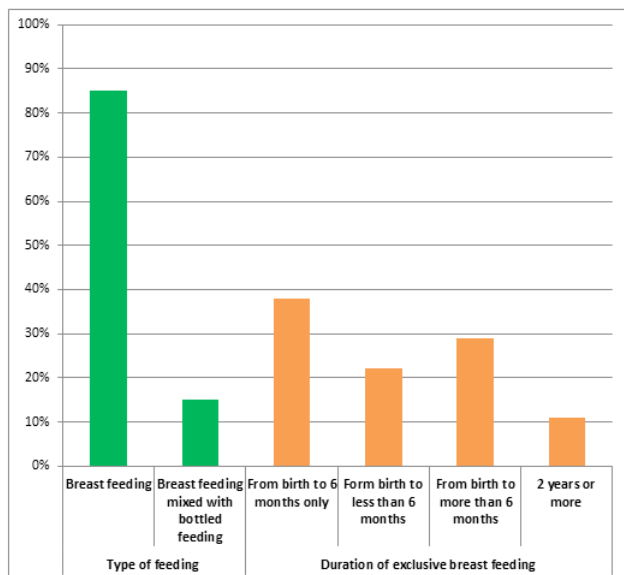
85% of study subjects depend on breastfeeding only for their infants and 15% depend on breast feeding mixed with bottled feeding (Table 3) (Figure 3).

Table 2. Dietary changes of study subjects during pregnancy and after delivery (N=376)

Mother diet	Eat more		Eat about the same		Did not eat before and now	
	Frequency	%	Frequency	%	Frequency	%
Milk and milk products	270	72%	71	19%	35	9%
Egg	231	61%	139	37%	6	2%
Tuna	215	57%	125	33%	36	9%
Fish	189	50%	161	43%	26	7%
Meat	291	77%	73	19%	12	3%
Herbals	91	24%	56	15%	229	61%
Vitamins	271		31		74	
Any food allergy	No: (frequency,%)			Yes (frequency,%)		
	361 (90%)			15 (10%)		

Table 3. Breast feeding practices among study subjects (N=376)

Variable	Group	Number	Percentage
Type of feeding	Breast feeding	321	85%
	Breast feeding mixed with bottled feeding	55	15%
Duration of exclusive breast feeding	From birth to 6 months only	143	38%
	From birth to less than 6 months	84	22%
	From birth to more than 6 months	109	29%
	2 years or more	40	11%

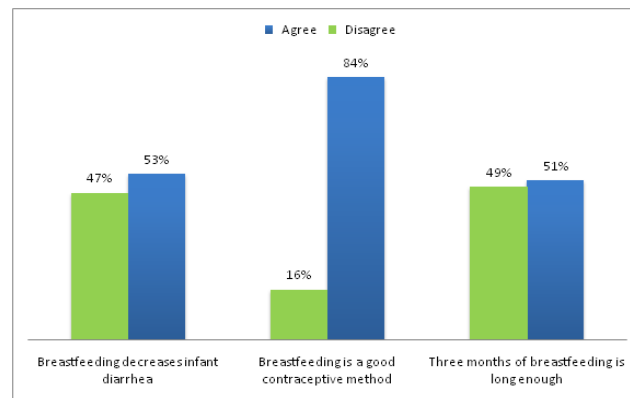


**Figure 3.** Represent breastfeeding practices among study subjects (N=376).

### 3.4 Knowledge and Attitudes towards Breastfeeding

54% disagree that breastfeeding is easier than infant formula feeding (Table 4). 84% agree that breastfeeding is a good contraceptive method, 80% agree that breastfeeding has no negative effect on marital relationship. All participants agree that community encourages breastfeeding over

feeding infant formula and also all of them agree that doctors and nurses encourage breastfeeding. 92% disagree with maternity leave of 3 months is enough to successful breastfeeding and also 86% disagree that work places provide designated areas for breastfeeding. (Figure 4)



**Figure 4.** Represent knowledge of lactating women toward breastfeeding.

### 3.5 Problems in Breastfeeding

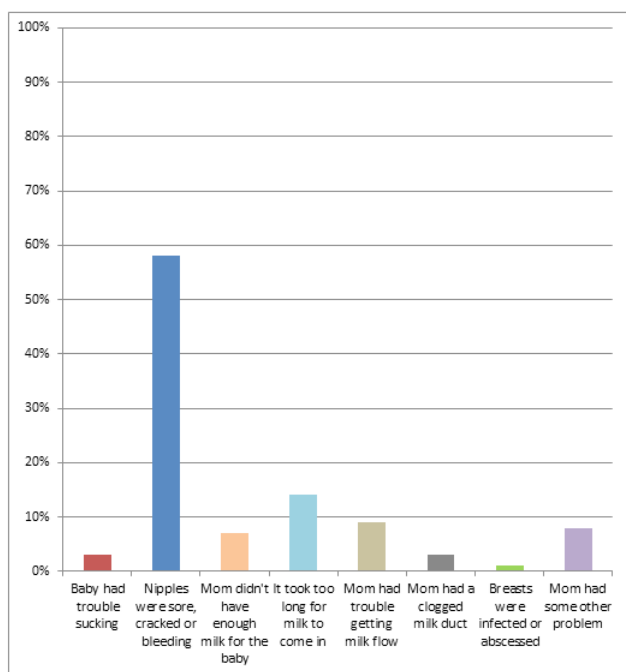
Regarding the problems occurs during breastfeeding, 58% of lactating mothers in this study reported nipples were sore, cracked or bleeding (Table 5), 3% reported that baby had trouble sucking. 7% reported insufficient milk for the baby. (Figure 5)

**Table 4.** Knowledge and Attitudes of subject group towards breastfeeding (N=376)

Knowledge				
	Agree		Disagree	
	Number	Percentage	Number	Percentage
Three months of breastfeeding is long enough	219	51%	157	49%
Breastfeeding is a good contraceptive method	315	84%	61	16%
Breastfeeding decreases infant diarrhea	198	53%	178	47%
Attitudes				
	Agree		Disagree	
	Number	Percentage	Number	Percentage
Breastfeeding being easier than feeding infant formula	172	46%	204	54%
It is not difficult for breastfeeding mother to care for family	78	21%	298	79%
Breastfeeding has no negative effect on marital relationship	301	80%	75	20%
Breastfeeding is a good way to decrease family expenses	331	88%	45	12%
Feeding infant formula keep the body well shaped and prevent over-weight	319	85%	57	15%
Community encourages breastfeeding over feeding infant formula	376	100%	-	-
Doctors and nurses encourage breastfeeding	376	100%	-	-
Maternity leave of 3 months is enough to successful breastfeeding	60	16%	346	92%
Work places provide designated areas for breastfeeding	54	14%	322	86%

**Table 5.** Problems in breastfeeding (N=376)

Problems in breastfeeding	Number	Percentage (%)
Baby had trouble sucking	12	3
Nipples were sore, cracked or bleeding	219	58
Mom didn't have enough milk for the baby	25	7
It took too long for milk to come in	52	14
Mom had trouble getting milk flow	34	9
Mom had a clogged milk duct	11	3
Breasts were infected or abscessed	2	1
Mom had some other problem	31	8



**Figure 5.** Represent reported problems in breastfeeding among study subjects.

### 3.6 General Health, Current Medication and Cosmetics use by Lactating Mother

26% take vitamin D supplements (Table 6) and only 11% take calcium supplement during lactation.

### 3.7 Health Status of Lactating Mother

37% of study subjects with initial body weight of 65 to 75 kilograms (Table 7) and 21% with uncontrolled blood

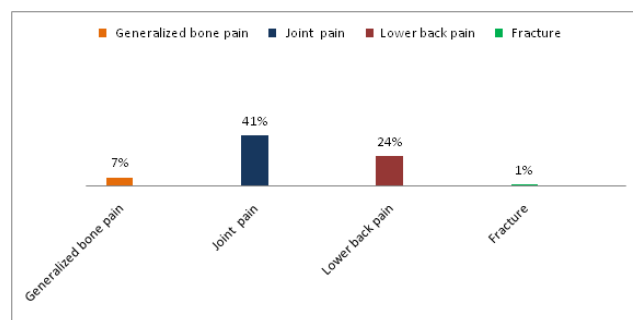
glucose. (Figure 6)

**Table 6.** General health, current medication and cosmetics use by lactating mother (N=376)

Variable	Group	Number	Percentage
Use of antibiotics	Yes	64	17%
	No	312	83%
Sunlight exposure	Often	126	34%
	Sometimes	174	46%
	Rarely	62	16%
	Never	14	4%
Use of sunscreen lotions	Yes	173	46%
	No	203	54%
Taking vitamin D supplements	Yes	97	26%
	No	279	74%
Taking calcium supplement during lactation	Yes	42	11%
	No	334	89%

**Table 7.** Health status of lactating mother (N=376)

Variable	Group	Number	Percentage
Initial body weight	45 kilo	26	7%
	45-55 kilo	43	11%
	55-65 kilo	91	24%
	65-75 kilo	139	37%
	75-85 kilo	46	12%
	More than 85	31	8%
Skin pigmentation	Yes	67	18%
	No	309	82%
Diarrhea	Yes	32	9%
	No	344	91%
Upper respiratory tract infections	Yes	56	15%
	No	320	85%
CNS complications	Yes	16	4%
	No	360	96%
Blood glucose	Controlled	297	79%
	Uncontrolled	79	21%



**Figure 6.** Represent bone complains among study subjects.

### 3.8 Bone Health among Study Subjects

7% of participant reported generalized bone pain (Table 8), 41% reported joint pain and 24% with lower back pain and 1% reported fracture (Table 9).

**Table 8.** Bone health among study subjects (N=376)

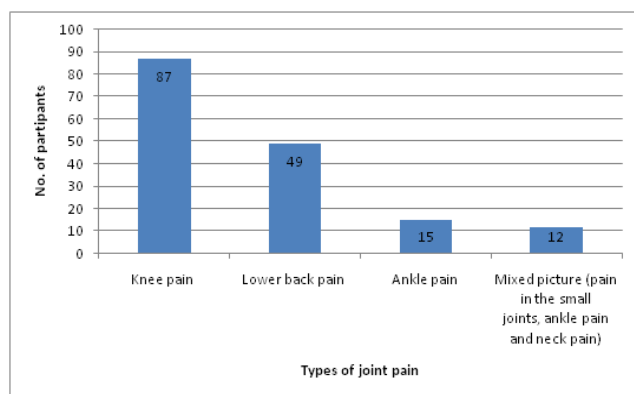
Variable	Group	Number	Percentage
Generalized bone pain	Yes	26	7%
	No	350	93%
Joint pain	Yes	163	41%
	No	213	59%
Lower back pain	Yes	92	24%
	No	284	76%
Fracture	Yes	3	1%
	No	373	99%

### 3.9 Joint Pain among the Study Subjects

Various types of joint pain were observed viz. pain in knee, lower back and in ankle 53.37%, 30.06% and 9.2% respectively. Mixed picture like pain in the small joints, wrist pain and neck pain was reported in 7.36% of the participants. (Table 9, Figure 7)

**Table 9.** Joint pain among the study subjects

Variable	Number	Percentage
Knee pain	87	53.37
Lower back pain	49	30.06
Ankle pain	15	9.20
Mixed picture (pain in the small joints, ankle pain and neck pain)	12	7.36



**Figure 7.** Joint pain among the study subjects.

### 3.10 Sleep Pattern and Arrangement

Majority (79%) of lactating mothers participated in this study reported continuous sleeping for three to six hours (Table 10).

**Table 10.** Sleep pattern and arrangement

Variable	Number	Percentage
Less than 3 hr	31	8%
3-6 hr	297	79%
6-8 hr	27	7%
More than 8	21	6%

## 4. Discussion

Around the world many studies were carried out to understand the importance of breastfeeding practice on the neonatal health and many guidelines were also set for the breastfeeding practice, but unfortunately very few studies were conducted to understand the effect of breastfeeding on the nursing mothers bone health with respect to duration and frequency of feeding. Although pregnant and lactating women face a comparable demand in the amount of calcium that must be provided, the adaptations during each of these reproductive periods are quite different. The daily transfer of calcium from the mother to her infant during lactation ranges from 250 mg to 300 mg and has been observed to be as high as 1,000 mg/day. With a summation of this transfer, the mother could lose 25g to 30g of calcium over a three month period of lactation, representing approximately 3% of her body's calcium stores. This has been found to increase steadily if the mother continues to breastfeed, with a 6% total body calcium loss after six months of lactation<sup>3,4</sup>. However, previous research has supported that bone remineralization occurs at equivalent or higher rates after lactation is complete<sup>7,8</sup>. Few studies reveal that pregnancy and lactation normally do not cause any adverse long term consequences to the maternal skeleton<sup>9-12</sup>. But in our surrounding we have observed many nursing mother complain about the joint pain and generalized weakness. Based upon these observations we have conducted a survey based-study in the northern region of Saudi Arabia where 376 nursing women were interviewed with a set of questionnaires (English and Arabic language) at their home. After compilation of all data, we have observed few interesting findings like 41% of all the lactating women were complaining about the joint pain.

Among them 53.37 % (87 mothers) complaining about knee pain, 30.06 % (49 mothers) were suffering from lower back pain, 9.2% (15 mothers) suffering from ankle pain and 7.36% (12 mothers) were complaining

about the mixed picture of joint pain including pain of the small joints and neck pain. Among this 41% of the nursing mother mostly are those mothers who have practiced breastfeeding more frequently and more than 1 year. From this data it's very much sure that maturational lactation has impact on bone weakening.

During the pregnancy, there is drastic increase in the body weight especially in the third trimester of pregnancy this additional weight gradually decreases with the time after the delivery this additional weight may be one of the contributing factors for the knee pain which was found 30.06% in our study.

A number of prospective studies have investigated the skeletal response to pregnancy and lactation by measuring bone density<sup>13,14</sup>, suggest that bone density may decrease in skeletal regions rich in trabecular bone, such as the spine and hip<sup>15,16</sup>. Moreover, Pearson et al., showed non-significant 1% decline in Bone Mineral Density (BMD) at spine and hip during pregnancy and a constant pattern of bone loss during lactation especially at spine. In addition, restoration of 5% of the pre-conceptual BMD value at spine and trochanter with less recovery at total hip<sup>15,17</sup>.

In the Middle Eastern countries and especially Saudi culture which is mainly Islamic people are very supportive of breastfeeding. In the Islamic culture, the Qur'an provides followers of Islam with special instructions regarding the duration of suckling, weaning and rearing of infants. The Qur'an therefore promotes breastfeeding: 'Mothers shall give suck to their children for two full years for those who desire to complete the term'<sup>18</sup>. (Qur'an, 2:233).

Breastfeeding is of particular interest due to the deleterious effects of hypoenestrogenemia coupled with a loss of calcium in breast milk on maternal bone mass. Lactating women lose 250 to 400 mg of calcium daily through breast milk<sup>9,19,20,21</sup>. During breastfeeding, an increase in skeletal resorption and probably an increase in renal conservation of calcium occur<sup>22,23</sup>. Contrary to pregnancy, breastfeeding is not associated with intestinal calcium hyper absorption<sup>14,15,23,24</sup>. A large number of short-term, prospective, controlled or non-controlled studies suggest that breastfeeding is associated with a loss in Bone Mineral Density (BMD)<sup>25</sup>. It also has been suggested that there is a dose-response relationship between longer periods of breastfeeding and larger losses in BMD. However, this reduction in BMD has been shown to be reversible 6-18 months after weaning in other words,

the decrease in BMD will be replaced a few months after the mother stops breastfeeding<sup>25</sup>. Despite the transient bone loss during breastfeeding, the long-term effects of these events on postmenopausal BMD are still a matter of controversy.

Also the intake of calcium supplement and vitamin D found to be low among lactating females, which may be associated with deficiency of calcium and predisposing the lactating mother to bone and joint pain.

## 5. Conclusion

This survey highlights an important but unnoticed aspect of the bone health of lactating women in the Northern Region of Saudi Arabia. During pregnancy, women consume calcium supplements to satisfy the requirement of developing baby but after child birth, they halt calcium supplement though it's needed. Our finding suggests that calcium supplement is required even after the child birth, because 41% lactating women encountered several bone related issues. Based on this study we state that a need exists to prepare and followed guidelines for the use of calcium supplement for the lactating women to maintain the good health of bones.

## 6. Acknowledgments

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"As per policy of our institute no institutional review board approval is required for noninvasive survey-based studies".

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