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EFFECT OF ZAM ZAM WATER INTAKE DURING LABOR ON MATERNAL AND NEONATAL OUTCOME: A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Management of the oral intake of parturient seeks to provide adequate hydration and nutrition while maintaining safety for mother and baby. How to achieve this balance remains a controversial subject (Parsons, 2001).This study aimed to identify the effect of Zam Zam water intake during labor on maternal and neonatal outcomes. Design: Randomized controlled trial. Setting: This study was conducted at the birth centre in Abha general teaching hospital- Kingdom of Saudi Arabia. Sample: A total of 250 nulliparous women that attended labor and delivery rooms. The inclusion criteria were women in labor, age between 20-35 years old, in latent phase (from tip of the finger up to 3 cm cervical dilatation), at term (37 or more), with a singleton cephalic presenting fetus and free from any medical or obstetric disorders. Procedure: Women in the study group were advised to consume regular amounts of Zam Zam water of total 700 cc. and no other oral ingestion was permitted. The laboring woman received 600 cc. throughout the latent phase, started from admission and after the baseline assessment. The laboring woman received this amount three times, 200 cc every hour. While early in active acceleration phase (from 4-7 cm cervical dilatation), she received 100 cc of Zam Zam water in form of ice chips. Oral intake stopped when the active deceleration phase has been started (from 8-10cm cervical dilatation). Results:Mothers in the study group (Zam Zam water) had better and faster labor progress than those in the control group (plain water). In addition, by the end of labor, plasma β-hydroxybutyrate was significantly increased and plasma glucose significantly decreased in the plain water group. There was a significant statistical differences related to the umbilical artery PH in favors of Zam Zam water. Conclusion: Zam Zam water may provide safer alternative nutritional strategy to solids in labor.

Keywords: Zam Zam water, Oral intake, Food, Normal labor, Maternal outcome, Neonatal outcome

INTRODUCTION

The oral intake of modest amounts of clear liquids (e.g. water, clear tea, black coffee, and sports drink) may be allowed for uncomplicated laboring women (American Society of Anesthesiologist's, 2007; The American College of Obstetricians & Gynecologists, 2009). In addition, The American College of Obstetricians and Gynecologists (ACOG) allowing laboring women more than a plastic cup of ice up to two hours before anesthesia (The American College of Obstetricians & Gynecologists, 2009). To date five randomized controlled trials, in fewer than 1000 women, have evaluated the influence of calorific intake on outcome of labor (CNM Data Group, 1999; Yiannouzis, 1994; Scrutton, et al., 1999; Kubli, et al., 2002; &Scheepers, et al. 2002).Four studies reported no significant differences in either the mode of delivery or neonatal outcome(Yiannouzis, 1994; Scrutton, et al., 1999; Kubli, et al., 2002; &Scheepers, et al. 2002). However, one study reported longer labors in women who consumed food (CNM Data Group,1999) and another showed an almost threefold increase in the rate of caesarean delivery (Scheepers, et al., 2002). Evidence from Cochrane library shows that restricting oral fluid and food intake during labor in women at low risk of needing anaesthesia is not necessary. Women may drink during established labor and be informed that isotonic drinks may be more beneficial than water (Singata, et al., 2010). However, until now, there were no studies looked at the effect of Zam Zam water oral intake on maternal and fetal outcome compared with other oral fluid

intake. So, this controlled study looking at identifying the effect of Zam Zam water intake during labor on maternal and neonatal outcomes.

AIM

To identify the effect of Zam Zam water intake during labor on maternal and neonatal outcomes.

MATERIAL AND METHOD

Conceptual Explanation

Zam Zam is the name of a famous well in al-Masjid al-Haraam (the Sacred Mosque in Makkah), which is thirty-eight cubits (a unit of length) away from the Ka'bah (Zam Zam Studies and Research Centre, 2005). It is recommended for pilgrims on Hajj and Umrah in particular, and for all Muslims in general, to drink Zam Zam water. According to a talk by Prophet Mohammed concerning the water of Zam Zam, "It is a blessing; it is food and a cure for the sick". Drinking Zam Zam water means that a person can be healed when drinks it with faith and sincerity (Imam Muslim, 2473). The content of Zam Zam water includes fluorides that have an effective germicidal action (The institute of the Custodian, 2005). Further, microbes cannot survive in it, which means that Zam Zam water preserves its taste and is not a congenial environment for bacteria. The institute of the Custodian also examined the extent of purity of Zam Zam water and found that it has a wonderful physique that makes it different from other drinkable liquids because it is naturally sterile that has no germs in it (Institute of the Custodian, 2005). Water in general is considered as mineral and therefore, sells best if the rate of minerals there in is from 150 to 350 mg/liter. As for Zam Zam water, the rate of minerals is 2000 mg/liter (Yahya, 1983). The most remarkable minerals in Zam Zam water are; calcium, sodium, magnesium and potassium. Zam Zam water is considered as the richest of all waters in the world in calcium (Hussain & Ahmed, 2010). The rate of calcium in Zam Zam water is 200 mg/liter (The annual report of the ministry of agriculture & water resources, 1971). In addition, Zam Zam water is considered as digestive, the rate of bi-carbonates is 366 mgs/ liter as compared with the most famous mineral water in France, in which the rate of bi-Carbonates is 357 mgs/ liter. (Nabulsi, 2007). Zam Zam water has never been chemically treated or chlorinated as in the case with water pumped into the cities. Its hydrogen component is 7.5, indicating that it is alkaline to some extent (Saudi Geological Society & Central-Mosque, 2006). After matching up the chemical analysis to to the specifications of the World Health Organization, results proved the beneficial effect of Zam Zam water on the body (World Health Organization, 1984). Additionally, Zam Zam water contains high level of sodium estimated as 133mg/L (Koshak, 1983). Dry weather makes Zam Zam more saline through evaporation, which is considered to be good for the human body (Zam Zam Studies & Research Centre, 2005).

Design

Randomized controlled trial.

Setting

This study was conducted at the birth centre in Abha general teaching hospital- Kingdom of Saudi Arabia. The maternity hospital provides services for approximately a total of 3819 deliveries; 2000 normal deliveries (52.4%) and 1819 caesarean section (47.6%) deliveries per year (local statistical unit, 2010).

Context

There was no written policy for the management of oral intake for laboring women in Abha general hospital. But there was an agreed practice for restricting oral intake to clear fluids once labor was established.

Sample

A total of 250 nulliparous women that attended labor and delivery rooms. The inclusion criteria were women in labor, age between 20-35 years old, in latent phase (from tip of the finger up to 3 cm cervical dilatation), at term (37 or more), with a singleton cephalic presenting fetus and free from any medical or obstetric disorders. Women who underwent induction, who received intramuscular

pethedine as analgesia (i.e. due to its well-documented effect of delaying gastric emptying time) were excluded from the study. The sample size has been determined utilizing sample equation based on the percentage of primipara admitted into the labor and delivery unit per year (20%).

Protection of Human Rights

An official permission was obtained from the administrative authorities of birth centre in Abha general teaching hospital for conducting the study. All participants have been informed about the purpose of the study with a view to obtain their acceptance to participate in the study documented with a written consent, ensuring that all data obtained were to be strictly confidential.

OUTCOME MEASURES

Primary outcome

Plasma β-hydroxybutyrate, blood glucose, duration of labor and Apgar scores.

Secondary outcome

Frequency of any vomiting, mode of delivery and umbilical artery PH.

TOOLS AND MEASUREMENTS

Data collection tools included the following; 1) a structured interview questionnaire including socio-demographic and obstetrical data, 2) maternal and neonatal evaluation sheets (Partograph and Apgar score) and 3) laboratory investigations.

A structured interview questionnaire

This questionnaire was developed in order to present the data as follows; 1) sociodemographic data in terms of age, educational level and occupation and 2) initial assessment data and obstetric history in terms of woman's parity, gestational age, baseline vital signs and abdominal examination (i.e. fundal level, fetal position and presentation).

Maternal and neonatal evaluation sheets

2. a. Partograph is a graphic representation of the event of labor progress plotted against time. It is a standardized design done by World Health Organization to help the management of labor (World Health Organization, 1994). It includes three main sections; maternal condition, labor progress and fetal condition.

2. b. Apgar score is a method of rapid evaluation of the infant cardio-respiratory adaptation after birth. Apgar score consists of five objective signs (heart rate, respiratory rate, muscle tone, reflex irritability and color). These signs are given a score of 0, 1, or 2 evaluated at the first and fifth minutes after delivery and receive a total scores ranging from 0 to 10 (Apgar, 1953).

Laboratory investigations

Blood plasma β-hydroxybutyrate (i.e. in labor, β-hydroxybutyrate is the principal ketone produced as a result of starvation, 2.5 cm of blood sample should be withdrawn by heparin syringe and stored in ice immediately), blood glucose and umbilical artery blood gases.

PROCEDURE

The researcher attended the labor unit four days per week for ten months. Data collection procedure has been done through randomization and utilization of the nursing process in terms of interviewing, history taking, assessment, implementation and outcome evaluation.

Recruitment of participants and randomization

Two steps selection process were used to ensure the randomization. The first of which was identifying the random sample, this step was done on the admission to labor unit. Every woman who has met the eligibility criteria and had even number on her admission ticket was recruited in the study. The second drawing was random assignment of the sample into two groups after signing the written consent. Random assignment was performed using 250 sealed envelopes, each one contains letter “S” or “C”.

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The subject with letter "S" enrolled in the study group, while the subject with letter "C" enrolled in the control group.

Interviewing and history taking

On admission, each woman who met the inclusion criteria was interviewed for clarifying the purpose of the study. The baseline data were collected from both groups using the structured interview questionnaire. The interview took around 10 minutes to be completed.

ASSESSMENT

Initial assessment was performed for each woman to obtain the baseline data on admission such as vital signs, abdominal palpation and fetal heart sound auscultation as well as vaginal examination for cervical dilatation, effacement and amniotic fluid condition. Blood sample for plasma β-hydroxybutyrate and blood glucose were taken beside a routine blood investigations on admission. Each uterine contraction was assessed to identify its frequency, duration and intensity. The vaginal examination was carried out by an on-duty physician every 2 hours (it was a protocol for assessment of primipara woman). Fetal heart sound was evaluated every 30 minutes during the active phase. Assessment of temperature was done every 2 hours; whereas assessment of blood pressure, pulse and respiration were done every an hour. Assessment of any signs of maternal distress was done and repeated (i.e. vomiting, excessive perspiration, tachycardia, shallow respiration, etc.).

IMPLEMENTATION

The overall intervention elements were grounded by the theory of comfort (Kolcaba, 1994). Comfort defined as the state that is experienced by recipients of comfort measures. It is the immediate and holistic experience of being strengthened through having the needs met for the three types of comfort (relief, ease, and transcendence) in four contexts of experience (physical, psycho- spiritual, social, and environmental) (Kolcaba, 1994). Relief defined as the state of a recipient who has a specific need met, while ease defined as the state of calm or contentment, and transcendence is the state in which an individual rises above his or her problems or pain (Kolcaba, 2003). In the present study, we attained the comfort in term of relief and ease. ***Relief*** addressed when mother's anxiety relieved through establishing rapport, maintaining her privacy, providing reassurance and information, instilling hope, listening attentively, observing non-verbal cues as well as maintaining maternal and fetal physical state stable (i.e. maintaining physical stability achieved through adequate dehydration, assessment and reassessment after intervention compared with the baseline data). While ***ease*** achieved in term of minimizing stimulation (i.e. inform woman when routine vital signs, fetal assessments, and vaginal exams might be done), environmental control (orient woman to the setting; call lights, phone system, lighting switches, extra blankets, ect.) and continuous family support through phone calls. A trusting relationship was established through providing emotional support and accurate answers of her questions.

After randomization, women in the study group were advised to consume regular amounts of Zam Zam water of total 700 cc. and no other oral ingestion was permitted. The laboring woman received 600 cc. throughout the latent phase, started from admission and after the baseline assessment. Woman received this amount on three times, 200 cc every hour. While early in active acceleration phase (from 4-7 cm cervical dilatation), she received 100 cc of Zam Zam water in form of ice chips. Oral intake stopped when the active deceleration phase has been started (from 8-10cm cervical dilatation). The amount of water intake based on Scrutton, et al. who reported that,oral intake of isotonic drink of 200 ml/hour throughout normal labor would be enough to provide a metabolic effect that prevents a ketosis (Scrutton, et al., 1999). In addition, American College of Nurse-Midwives guidelines limit oral intake during the latent phase of labor to clear liquids, and during the active phase to sips of water or ice chips (American College of Nurse-Midwives, 2008). Regarding the control group, woman received plain water (700cc.) like a study group regimen. While both groups received 500 cc of ringer lactate I.V. line as a routine hospital management when the active phase started (4cm cervical dilatation).

Outcome evaluation

Labor duration was assessed through three stages; first, from the 4cm cervical dilatation to full cervical dilatation (active phase) and the duration was recorded in hours. Second, from full cervical

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dilatation up to complete fetal delivery and this was recorded in minutes. Third, from fetal delivery up to placental delivery and the duration was recorded in minutes. Another two blood samples were taken, one from umbilical artery for PH. The other one from delivered woman for reassessment of blood glucose and Plasma β-hydroxybutyrate.Apgar score evaluation for the first minute and re-checked after 5 minutes for neonatal condition evaluation.

STATISTICAL ANALYSIS & RESULTS

Statistical package for the social science (SPSS) was used for statistical analysis of the data. For all the statistical tests done, the threshold of significance was fixed at the 5% level the 5% level (P-value).

Descriptive Characteristics of the Sample

There were no statistical significant differences between groups related to age, level of education, ethnicity and gestational age. The age ranged between 20-35 years old. All mothers received some degree of education. Minority of mothers in both groups had preparatory and university education. Furthermore, most of women were Saudi and the range of gestational age at the time of delivery was 37- 41 weeks gestation, (Table 1).

Table 1.Characteristics of mothers among the study and the control groups

Items	*Study group (Zam Zam water) (n=125)*		*Control group (Plain water) (n=125)*			
	Mean	*SD*	*Mean*	*SD*	*t*	*p*
Age	22.41	1.38	22.12	1.35	1.71	0.08
Gestational age	39.60	1.92	39.42	1.02	1.44	0.15
Education level						
	No.	%	No.	%	χ^2	P
1- Read & Write	27	21.6	27	21.6	0.01	1.00
2-Primary School	31	24.8	36	28.8	0.51	0.47
3-Preparatory School	18	14.4	20	16.0	0.12	0.72
4-Secondary School	30	24.0	27	21.6	0.20	0.65
5-University	19	15.2	15	12.0	0.54	0.46
Ethnicity						
Saudi	76	60.8	73	58.4	0.15	0.69
Egyptian	34	27.2	37	29.6	0.17	0.67
Yamane	9	7.2	11	8.8	0.21	0.64
Indian	6	4.8	4	3.2	0.41	0.51

Level of significance at $p \leq 0.05$

Labor Progress and Duration

Regarding pattern of labor progress, findings demonstrated that labor progress pattern was within normal among both groups. It was noticed that, mothers in the study group had better and faster progress than those in the control group. There were a statistical differences between groups ($P \leq 0.05$) related to frequency and duration of uterine contractions throughout the active phase as well as duration of the first stage of labor. Moreover, mothers in the study group had a shorter duration of labor than mothers in the control group with total of 6.88±0.53 SD hours in the study group v/s total of 7.03±0.25 SD hours in the control group (t=-2.37, p=0.02), (Table 2).

Labor Outcome

There was a significant statistical difference between groups related to number of vomiting episodes throughout labor. The total quantity of liquid reserved was significantly more in Zam Zam water group compared with the plain water group. While there is no differences noted related to received analgesics and antiemetic drugs. In addition, there were significant differences between groups regarding mode of delivery and first minutes Apgar score in favors of Zam Zam water (Table 3).

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Table 2.Labor progress and duration among the study and the control groups

Items	*Study group(Zam Zam water)(n= 125)*		*Control group(Plain water)(n = 125)*			
	Mean	*SD*	*Mean*	*SD*	*t*	*P*
-Frequency of uterine contractions during the active acceleration phase in 10 minutes.	4.02	0.30	3.90	0.25	3.45	0.001
-Duration of uterine contractions during the active acceleration phase/ second.	46.49	0.60	46.17	0.78	3.61	0.0001
-Frequency of uterine contractions during the active deceleration phase in 10 minutes.	4.60	0.33	4.50	0.23	2.65	0.001
-Duration of uterine contractions during the active deceleration phase/ second.	54.48	0.54	54.32	0.48	2.31	0.02
-First stage of labor (hrs.)	6.04	0.48	6.17	0.14	-2.89	0.004
-Second stage of labor (min.)	44.53	1.26	44.95	1.36	-2.50	0.01
-Third stage of labor (min.)	6.35	1.44	6.44	1.38	-0.53	0.59
Total labor (hrs.)	6.88	0.53	7.03	0.25	-2.94	0.01

Level of significance at p ≤0.05

Table 3.Labor outcome among the study and control group

	Study group(Zam Zam water)(n= 125)		*Control group(Plain water)(n = 125)*			
	No.	*%*	*No.*	*%*	χ^2	*P*
Vomiting frequency during first stage of labor						
One time	18	14.4	14	11.2	0.57	0.44
Two time	4	3.2	13	10.4	5.11	0.02
No vomiting	103	82.4	98	78.4	0.63	0.42
	Mean	*SD*	*Mean*	*SD*	*t*	*P*
Vomitus volume (cc.)	150.68	1.72	154.40	1.63	-	0.001
Drugs used during first stage of labor						
Analgesics	10	8.0	12	9.6	0.19	0.65
Antiemetic	22	17.6	27	21.6	0.63	0.42
Nothing	93	74.4	86	68.8	0.96	0.61
Mode of delivery						
Vaginal delivery with episiotomy	116	92.8	105	84.0	4.72	0.03
Caesarean section	9	7.2	20	16.0	4.72	0.03
Reasons for caesarean section						
Maternal distress	5	4.0	10	8.0	1.77	0.18
Fetal distress	4	3.2	7	5.6	0.85	0.35
Non progressive active phase	0	00.0	3	2.4	3.03	0.08
	Mean	*SD*	*Mean*	*SD*	*t*	*p*
Newborn outcome						
First minutes Apgar	7.83	0.27	7.76	0.28	1.89	0.05
Fifth minutes Apgar	9.82	0.38	9.76	0.42	1.24	0.21

Level of significance at p ≤0.05

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Blood Values among Both Groups

Regarding blood values, the two groups were similar in all of the baseline metabolic results measured early in labor. However, by the end of labor, plasma β-hydroxybutyrate was significantly increased and plasma glucose slightly decreased in the plain water group. In addition, there was a significant statistical difference related to the umbilical artery PH in favors of Zam Zam water (Table 4).

Table. 4. Blood values among both groups

Items	*Study group (Zam Zam water) (n= 125)*		*Control group (Plain water) (n = 125)*		*t*	*P*
	Mean	*SD*	*Mean*	*SD*		
Baseline plasma values of metabolites						
#Blood glucose level (mg/dl)	82.75	1.79	82.72	1.69	0.11	0.91
*Plasma β-hydroxybutyrate (mg/dl)	0.11	1.76	0.11	1.96	0.34	0.73
Plasma values of metabolites at the end of first stageof labor						
#Blood glucose level (mg/dl)	79.12	1.14	78.57	1.58	3.14	0.02
*Plasma β-hydroxybutyrate (mg/dl)	0.19	1.76	0.21	1.96	-3.01	0.001
+Umbilical artery PH	7.30	1.26	7.29	1.26	2.01	0.05

Normal range of blood glucose is 80-120 mg/dL

*Normal range of β-hydroxybutyrate is 0.21 to 2.81 mg/dL

+ Normal range of umbilical artery PH is 7.30 to 7.40 (pH > 7.4 is an alkalosis, pH < 7.3 is an acidosis).

DISCUSSION

Methodological Considerations

To our best knowledge, this is the first study on the influence of Zam Zam water intake during labor. In the present study, all pregnant women were primigravida, nullipara. We did not recruit multiparous women, given their potentially quicker labors and low operative delivery rates, less exposure to the intervention and low prevalence of the primary outcome measure. Most of sample age was about 22 years old with mean of 22.41 vs. 22.12 years in both the SG and the CG respectively, being younger means low risk and less complications. Among 31,976 births, length of labor differed significantly by maternal age for both nulliparous and multiparous women (Greenberg, et al., 2007). Younger nulliparous women (age, ≤ 20 yrs.) had a shorter median second stage by up to 97 minutes ($P < .001$) than older nulliparous women (age, >39 yrs), low risk for caesarean section and stillbirth. Further, a higher proportion of nulliparous women between the ages of 30 and 40 will experience some form of labor dysfunction when compared with nulliparous women between the ages of 20 and 29 (Merrill, 2011).

Results Discussion

This study looked at identifying the effect of Zam Zam water intake during labor on maternal and neonatal outcomes. The obstetric guideline of the American Society of Anesthesiologists (2007) states that, the oral intake of solids during labor increases maternal complications and should be avoided (American Society of Anesthesiologist's 2007). Fluids generally empty more quickly and clear isotonic fluids seem to be the most rapidly absorbed medium for the administration of oral calories

(Vist&Maughn, 1994). It has previously been shown that consuming a light diet during labor prevents the increase in ketone production, but this happens at the expense of increasing the residual gastric volume (Takehiro, et al., 2004).

In fact, ketone bodies are produced in the liver and are used peripherally as an energy source when glucose is not readily available. Ketosis is seen in various physiological conditions such as fasting, prolonged exercise and high fat diet (Vist&Maughn, 1994). The present study found a significant inverse correlation between plasma glucose and plasma β-hydroxybutyrate throughout first stage of labor, with significant differences between groups in favor of Zam Zam water. This may be related to nutrient' s component of Zam Zam water. Zam Zam water contains minerals of the following concentration; 133 mg/L of sodium, 96 mg/L of calcium, 38.88 mg of magnesium, 43.3 mg/L of potassium, 195.4 mg/L of bicarbonate, 163.3 mg of chloride, 0.72 mg of fluoride, 124.8 mg/L of nitrate, 124.0 mg/L of sulfate, pH 8 and the total dissolve alkalinity of 835 mg/L (Hawting, 1980). Theses nutrient's components may help in reducing maternal ketosis during labor without increasing gastric volume. Production of β-hydroxybutyrate reduces high glucose, induced insulin secretion and augments basal insulin secretion from pancreatic islets (Beggs, 2002). Further, there was a significant inverse correlation between plasma glucose and free fatty acids during an 18-hour fast, with lipolysis and ketogenesis increasing as circulating glucose decreased (Metzger,et al. 1982; Wee, Brown & Reynolds, 2005).

Moreover, the present study denoted that, women who received Zam Zam water had shorter labor duration than those women who received plain water. This may be related to maintained blood glucose level among Zam Zam group. On consequence; reduced ketone bodies, preserved energy and facilitated good uterine contraction. Food and fluids provide fuel for energy and help labor remain physiologic (Hawting, 1980). From a metabolic point of view, it is hypothesized that the intake of energy rich substrates may have a positive influence on labor progression (Hazle, 2011). While hunger itself causes an increase in catecholamines, which in turn can postpone labor (Odent, 1998). Evidence for ketosis producing detrimental effects on the progress of labor is based upon a single study in which acetone in the circulation of guinea pigs was associated with reduced uterine contractility (Winkler &Hebeler, 1993). Although there was no difference in the duration of labor when caloric intake was in fluid form only (Lui, et al., 2007; Kubli, et al., 2002). There was an evidence that, a greater volume per hour of isotonic intravenous fluid when administered to nulliparous women in active labor was associated with significantly shorter duration of labor and lower frequency of both prolonged labor and oxytocin administration (Parsons, et al., 2007).

In addition, the present study represented a significant decreased caesarean section deliveries among Zam Zam water group. This result may be revealed to maintain blood glucose at normal level that lead to decreased incidence of both maternal and fetal distress. By another words, hunger and thirsty during labor causes stress. This lead to an increase in adrenaline and nor-adrenaline levels, owing to decreased efficiency of the uterine contractions, which may in turn adversely affect fetal heart rate and increase the need for medical intervention. The present result failed to be supported by others researches. From 2426 laboring women, researchers could not see any significant differences related to forceps deliveries or cesarean section rates between women who were allowed to eat lightly or to have just water during labor (Parsons, etal., 2007). In addition, there were no differences in caesarean birth percentage found between those patients who received calorific intake during labor and those who did not (Scrutton, et al., 1999; Kubli, et al., 2002 &Odent, 1998). Moreover, nulliparous women who were randomized to consume either a carbohydrate or a non-carbohydrate drink showed that the incidence of cesarean section was statistically higher in the carbohydrate group (Scheepers, et al., 2002 ;McGarry, 1971).

Regarding vomiting in labor, it is not a main theme in the majority of researches. Vomiting is thought to be a common event in labor; however, not all laboring women vomit. In addition, anti-emetics during labor not used as a measure to halt vomiting, but as a preventative treatment in conjunction with analgesia (McGarry, 1971). A randomized controlled trial assessed the risks and benefits of eating during labor predicted that, an increased risk of vomiting and aspiration was in the event of general anaesthesia (Scrutton, et al., 1999). This risk would be due to increased residual volume of gastric contents. The present study demonstrated that, mothers who received Zam Zam water had

lower frequency of vomiting than the control group. We cannot find a powerful interpretation for this result, but we can revealed this results to Zam Zam water effect on relieving the gastric upset from labor stressors, as well as the alkaline nature of Zam Zam water can neutralize excess hydrochloric acid formed in the stomach. The present result goes on the same direction with the results of other randomized trial reported that, isotonic drinks intake during labor does not increase the risk of vomiting (Kubli, et al., 2002). On the other hand, there is no significant difference in vomiting between women fed in labor and those who choose to take only fluids (Lui, et al., 2007; Parsons, 2009).

Moreover, the present study represented a significant difference between both groups, related to first minute Apgar score and umbilical artery's PH in favors of Zam Zam water. This result may be revealed to the nourished effect of Zam Zam water that prevent maternal ketosis and on consequence affect on intrauterine fetal condition. When the umbilical artery pH is less than 7.20, the odds of having an Apgar score < 7 at 5 minutes. Further, the odds of requiring neonatal intensive care admission is 2.3 times higher than if the pH > 7.20 (Granger, 2009). The present result congruent with the recommendations in the National Institute of Clinical Excellence (NICE) guidelines which stated that, women should be informed that having isotonic drinks during labor prevents ketosis without a concomitant increase in gastric volume and ensuring a better effect on maternal and fetal wellbeing (Lui, et al., 2007). In addition, the World Health Organization points out that, because labor requires enormous amounts of energy to ensure fetal and maternal well-being, the health care providers should not be interfere with the woman's wish for food and drink during labor (World Health Organization, 1997). On the other hand, the increase in beta-hydroxybutyrate and acetoacetic acids in labor has not been shown to have a correlation with either maternal or fetal acid base balance (Bencini& Symonds, 1972).

Finally, there are many Islamic experiments done on water. These tested the healing ability water possesses. All proved that we do not know yet the potential energy of the water (Abduldaem, 2010). Hence, we can safely say again that since water carries and brings life to plants and if the earth vibrates when water comes down on it, the human-body's cells would also be affected and vibrated when water enters these cells. That for water in general, how is it with Zam Zam water.

CONCLUSION

Zam Zam water may provide safer alternative nutritional strategy to solids in labor. This approach is used successfully for pilgrims on Hajj and Umrah in particular, and for all Muslims in general to whom parturients are frequently compared.

IMPLICATION FOR PRACTICE

Although many nursing interventions during labor are based on physician orders, many numbers of care processes are mainly within the realm of nursing practice. Evidence-based recommendations in the form of guidelines on eating and drinking in labor are still lacking. Without reliable research evidence for the management of oral intake for laboring women, no hospital practice or policy is valid. This leaves midwives with the responsibility of deciding what they believe is the best management.

LIMITATION OF THE STUDY

Assessment and reassessment of each case till delivery took time and effort, costs of blood investigations, in addition to lack of researches related to Zam Zam water effect on labor, all were difficult issues.

RECOMENDATIONS

Women choice of intake during labor should be observed and respected. Increase the health care provider's awareness of Zam Zam water values is essential to add changes in clinical practice. In addition, further longitudinal researches are needed in the future to confirm the results.

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