

Well-Being, Diabetes Management, and Breastfeeding in Women with Type 1 Diabetes Two and Six Months after Childbirth

Marie Berg* and Carina Sparud-Lundin

Institute of Health and Care Sciences, The Sahlgrenska Academy at University of Gothenburg, Gothenburg, Sweden

Abstract

Study background and aim: Besides adaptation to breastfeeding and to a changed lifestyle after childbirth mothers with type 1 diabetes have to deal with erratic glycaemia. The aim in this paper was to explore patterns in and associations between well-being, diabetes management, and breastfeeding in mothers with type 1 diabetes up to six months after childbirth, and to compare well-being in mothers with type 1 diabetes to a reference group of mothers without diabetes.

Methods: In a prospective observational survey with a case-control design, 108 mothers with type 1 diabetes were matched for parity and gestational week with 104 women in a reference group during 2007-2009. Telephone interviews were conducted two and six months postpartum using the Psychological General Well-Being index and a questionnaire on experience of diabetes management and breastfeeding. Associations were evaluated with a stepwise multivariate regression model.

Findings: Mothers with diabetes reported lower levels of general well-being and lower vitality than women in the reference group at six months after childbirth, lower general health at two and six months. A majority reported considerably more unstable glycaemia, especially in the first two months, and more hypoglycaemic episodes during the breastfeeding period. Explanatory factor for better well-being at two months was the lesser extent to which breastfeeding influenced diabetes management. At six months this factor, and longer duration of diabetes, explained better well-being.

Conclusion: Well-being in mothers with type 1 diabetes is negatively influenced if breastfeeding affects diabetes management. This suggests that social support from both professionals and peers is particularly important to these women.

Keywords: Breastfeeding; Type 1 diabetes; Support; Quality of life; Well-being

Abbreviations: DG: Diabetes Group; RG: Reference Group

Introduction

Given the numerous benefits to breastfeeding it is a global recommendation that mothers should exclusively breastfeed their infants for the first six months of their lives [1]; also including women with diabetes [2]. Besides adaptation to motherhood, women with type 1 diabetes after childbirth have to deal with erratic glycaemia including increased numbers of hypoglycaemic episodes, especially during the first weeks postpartum [3]. During lactation a glycaemic instability related to increased insulin sensitivity has been identified in humans [4] which have particular importance for mothers with diabetes who show a decreased need for insulin [5] due to the increased glucose consumption during the breastfeeding period [5,6]. It is reasonable to assume that general well-being in these mothers might be affected by the complexity of managing an unstable glycaemic situation at the same time as taking care of the new-born, including establishing breastfeeding.

In mothers with Type 1 diabetes breastfeeding has been found to be less frequent and of shorter duration [7,8]. However, it is not the maternal diabetes per se that explains the lower duration of partial or exclusive breastfeeding [8,9]. Instead, it is explained by increased frequency of caesarean sections, lower maternal age [9], lower education level, delivery at earlier gestational age, and delayed initiation or non-established breastfeeding at discharge from hospital [8,9]. During the breastfeeding period, mothers with diabetes have described how they have felt that they were "in the grip" of blood glucose levels and increased fear of hypoglycaemic episodes [10]. The challenge of becoming a mother as a woman with type 1 diabetes most likely requires

professional and peer support beyond that required by mothers in general after childbirth. The need for breastfeeding counselling and psychosocial support has been highlighted in a few studies [7,11], hence only a few have focused on support for diabetes management. These studies indicate that the extensive professional care provided during pregnancy and childbirth is often interrupted suddenly, and there is a gap in the continuity of care before reestablishment of contact with the ordinary diabetes clinic [12,13].

To summarize, breastfeeding appears to be more complex for mothers with diabetes than for mothers in general and few studies have explored the experiences of the experience of well-being in relation to diabetes management, breastfeeding [3,5] and support in early motherhood.

As part of a research project in Sweden on diabetes and early motherhood, the aim in this paper was to explore patterns in and associations between well-being, diabetes management, and breastfeeding in mothers with type 1 diabetes up to six months after childbirth. A further aim was to compare well-being in mothers with type 1 diabetes to a reference group of mothers without diabetes.

***Corresponding author:** Marie Berg, Institute of Health and Care Sciences, Sahlgrenska Academy, University of Gothenburg, Box 457; SE-405 30 Gothenburg, Sweden, Tel: +46317866084; Fax: +46307866120; E-mail: marie.berg@gu.se

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Materials and Methods

This is a prospective observational survey with a case-control design, comprising women with type 1 diabetes (diabetes group, DG) and a reference group (RG).

Setting and sample

Swedish-speaking mothers with type 1 diabetes in a Swedish region with four hospitals were invited to participate during a two-year period in 2007–2009. The routines of antenatal care for the target group varied between the four different settings, however in all settings, care was provided by a multidisciplinary team to prevent, detect, and treat potential maternal and foetal complications. After childbirth clinical practice focused on the new-born child, and included monitoring of blood glucose and supplemental feeding during the first and sometimes subsequent days of life in order to avoid neonatal hypoglycaemia. All women were encouraged to initiate breastfeeding early if possible, depending on maternal and neonatal conditions. Routines for postpartum diabetes care differed between the hospitals; in most cases mothers were expected to take the responsibility for reconnecting with their regular diabetes clinic. A facilitating condition for breastfeeding in Sweden is the long paid parental leave, a cost shared by the state and the employer; 480 days of parental leave per child of which two months are dedicated to each parent. This condition supports mother's possibility to breastfeed.

Mothers were included consecutively after childbirth. For every included woman with type 1 diabetes the next mother giving birth at the same hospital was invited as a reference if she fulfilled the matching criteria; gestational week and parity (primiparity vs. multiparity). The exclusion criteria were occurrence of any kind of diabetes, and the inability to understand and speak Swedish. All women were given verbal and written information about the study, and informed consent was collected prior to participation. The project was approved by the Regional Ethics Board (Dnr: 351-07).

Data collection

Data were collected via telephone interviews at two and six months postpartum, using the Psychological General Well-Being index (PGWB) to measure well-being [14] and a new questionnaire developed by the research group as no valid instrument was available focusing issues on diabetes management, glycaemic control, breastfeeding and support in early motherhood. To assure face validity, the questionnaire was tested for comprehensibility and relevance by 20 women; 10 women in each group (DG and RG). Only minor revisions were made and thus data from these women were included in the final analysis.

In the present article, the RG was used to compare the Psychological General Well-Being index including 22 items divided into six subscales: anxiety, depressed mood, positive well-being, self-control, general health, and vitality. The items are rated on a six-point Likert scale where 0 reflects the most distress and 5 the highest level of well-being; hence, the total score range is 0-110 [14]. The Psychological General Well-Being index (PGWB) has been developed according to evidence based routines for instrument development and has a high internal consistency reliability (Chronbach's alpha: 0.92) [15]. PGWB has been used in several studies on chronic conditions but has not earlier been used on this population group. A Swedish version of PGWB has been psychometrically evaluated, and shows similar satisfying results with respect to internal consistency [16].

Study variables in the questionnaire developed by the research group included socio-demographic data, breastfeeding pattern,

diabetes management support from health care professionals and significant others during childbirth and postpartum care, experience of diabetes management in relation to breastfeeding including occurrence of low and unstable blood glucose levels, insulin dose, and self-reported glycaemic control in terms of HbA1C. Items concerning professional and peer support were based on findings from earlier research [13,17,18]. Documentation of the women's blood glucose patterns one week before each telephone interview was requested in order to capture fluctuations in relation to breastfeeding and daily life postpartum. Unfortunately very few women managed to document their blood glucose pattern due to the demanding life situation in early motherhood which made analysis impossible.

The following additional data were collected from medical records: mode of delivery; maternal outcomes including preeclampsia, interventions in relation to foetal asphyxia, and haemorrhage; length of stay in maternal and neonatal care unit interventions; and diabetes-related data including insulin doses (in early and late pregnancy), insulin administration (pen/pump), diabetes classification according to White [19], and HbA1C in early and late pregnancy. In Sweden, HbA1C is analysed by the Mono-S method, which produces values around 1% lower than the standard values of the Diabetes Control and Complications Trial (DCCT)/National Glycohemoglobin Standardization Program (NGSP) [20]. Before analyses the Mono-S values were converted to IFCC units (mmol/mol) [21].

Data analysis

Continuous variables were analysed using descriptive statistics: mean (standard deviation/SD), median, and range (min-max); while *n* (%) was used for categorical and dichotomous variables. Analyses were conducted using two software packages: version 18.0 of SPSS (Chicago, IL) and version 9.2 of SAS (Cary, NC). All tests were two-tailed and conducted at the 5% significance level. Student's *t*-test was used to compare continuous variables (insulin doses, HbA1C) when roughly estimated to be normally distributed. The Mann-Whitney *U*-test was used to analyse differences between DG and RG in the total score and six subscales of Psychological General Well-Being index, and a change from two to six months postpartum was analysed with the Wilcoxon signed-rank test. Associations between the study variables and Psychological General Well-Being index in DG at two and six months after childbirth were investigated with the Mann-Whitney *U*-test for dichotomous variables, and Spearman's correlation for continuous or ordered categorical variables. Variables showing statistically significant associations with Psychological General Well-Being index were entered into a stepwise multivariate regression model with the total score as dependent variable, in order to obtain the best explanatory model. The presented parameter estimates, SE, *p*-values, and *R*² were taken from the multivariate regression models which included the best independent explanatory factors.

To discover a difference of at least 10% in well-being score (PGWB) where the Reference group have a mean value of 101 versus 91 in the Diabetes Group, standard deviation 0.25, we needed to include a minimum of 100 mothers in each group. Power: 80%, alpha=0.05, two-sided test. This goes for using *t*-test for comparison. Using the non-parametric Mann-Whitney *U*-test instead, 104 mothers are needed to be included in each group.

Results

Study group characteristics

Of 128 possible women with type 1 diabetes, 108 participated in

the study. The remaining 20 women were either not identified at time for inclusion or declined to participate, and did not differ from the included women in terms of age, gestational week, mode of delivery, and birth weight. In the RG, 104 mothers participated in the two-month interviews and 99 in the six-month interviews. Gestational week and parity were similar between the groups, as a consequence of the case-control research design. In the total groups of participants (DG+RG, n = 212), mean gestational week at childbirth was 37.9 (SD 1.8, median 38, range 30-41), and 53% were primiparas. Details on demographics and maternal and neonatal outcomes are described elsewhere [8]. In brief, mean age and education level did not differ between the DG and the RG. In the DG there were more inductions of labour, more caesarean sections, more frequent separation of mother and child early postpartum and longer postpartum stay. The rate of partial or exclusive breastfeeding differed significantly between the groups; at two months it was 81% in the DG and 95% in the RG, and at six months it was 62% in the DG and 79% in the RG [8].

Descriptive diabetes-related data for the mothers with type 1 diabetes are shown in Table 1. The insulin dose (IU/24 h) was not significantly lower at two months postpartum compared to pre-pregnancy/early pregnancy dose ($P=0.06$). Furthermore the insulin dose was lower at two months compared to six months postpartum ($P=0.018$). Insulin dose did not differ between breastfeeding and non-breastfeeding mothers at two months postpartum (mean 37.0, SD 13.6, vs. mean 45.3, SD 21.6; $P=0.115$), but at six months breastfeeding was associated with a lower insulin dose (mean 37.3, SD 14.3, vs. mean 45.7, SD 18.6; $P=0.016$). Glycaemic control in terms of self-reported HbA_{1c} was worse at six months compared to two months postpartum ($P < 0.001$). However, there was no difference in HbA_{1c} between breastfeeding and non-breastfeeding mothers either at two months ($P=0.935$) or at six months ($P=0.137$).

Experience of diabetes management, breastfeeding, and support

The women's experience of diabetes management in relation to breastfeeding is reported in Table 2. Two-thirds stated that breastfeeding had affected their diabetes management "quite a lot" or "very much" between birth and two months postpartum, and almost half that this

was the case between two and six months postpartum. Just over one tenth of the mothers reported that breastfeeding had not affected their diabetes management at all between birth and two months, and just over one fifth reported that this was the case between two and six months. At two months postpartum, around 70% of the group had experienced quite unstable or very unstable blood glucose levels, compared to 55% at the six-month interview. Experience of hypoglycaemia was more frequently reported at the two-month interview than at the six-month interview. About half of the breastfeeding mothers reported that their diabetes management was affected during the whole period (Table 2).

Table 3 presents the extent of diabetes management support received from professionals and significant others. Almost a third of the women reported no received support at all during labour and a quarter no received support at the postpartum maternity care unit. At the two-month interview, one fifth of the women reported receiving no support from the specialist antenatal care, and one fifth received no support from their regular diabetes clinic. The mean time for the first postpartum visit to the regular diabetes clinic was four months (SD 3.1). At six months, 83.3% (90 of 108 women) had visited the diabetes clinic. Almost two thirds of the women had experienced a great deal of support from their partner, and only a few no supports at all (Table 3).

Comparison of well-being in mothers with and without diabetes

Table 4 presents the mother's experience of well-being in terms of PGWB. At six months, the DG expressed worse self-reported general well-being than did the RG. Subscale analyses indicated that general health was lower in the DG both at two and at six months, without any improvement between two and six months. Vitality was also lower at six months in the DG compared to the RG. Both groups had improved their self-control at six months compared to two months postpartum (Table 4).

Association between well-being and independent variables in mothers with type 1 diabetes

In the bivariate analysis (Table 5), three independent variables were associated with well-being at two months in mothers with type 1

Variables	Women with type 1 diabetes (n= 108)
Years with diabetes	
Mean (SD) - Median (min-max)	15.7 (8.2) – 16.0 (1.0-33.0)
Diabetes classification* , n (%)	
White B	24 (22.2)
White C	48 (44.4)
White D	28 (25.9)
White F	8 (7.4)
Insulin administration , n (%)	
Syringe/pen	81 (75.9)
Pump (continuous subcutaneous insulin infusion)	26 (24.1)
Insulin dose, IU/24 h Mean (SD) - Median (min-max)	
Pre-pregnancy/early pregnancy dose	41.3 (15.2) – 39.5 (6.0-83.0)
2 months postpartum	38.7 (15.2) – 38.0 (3.0-90.0)
6 months postpartum	40.5 (15.0) – 39.0 (0-73.0)
Glycaemic control ** Mean (SD) - Median (min-max)	
HbA _{1c} - early pregnancy (first trimester, n=106))	53.1 (12.8) – 51.0 (28.0-102.0)
HbA _{1c} - late pregnancy (third trimester, n= 100)	45.8 (7.2) – 45.0 (31.0-68.0)
HbA _{1c} - 2 months postpartum* (n=65)	47.1 (6.9) – 47.0 (35.0-67.0)
HbA _{1c} - 6 months postpartum* (=84)	53.3 (13.1) – 52.0 (34.0-136.0)

*White B= Age onset <20yrs or diabetes duration <10 yrs. No microvascular complications. White C= Age onset 10-19 yrs or diabetes duration 10-19 yrs. No microvascular complications. White D= Age onset <10 yrs or diabetes duration >20 yrs, possible complications: hypertonia/simplex retinopathy. White F= Occurrence of nephropathy and proliferative retinopathy.

** Self-reported HbA_{1c}, reported as IFCC units (mmol/mol)

Table 1: Diabetes-related data for the study population.

Agreement with statements, n (%)	0-2 months postpartum*				2-6 months postpartum*			
	Very much	Quite a lot	Some	Not at all	Very much	Quite a lot	Some	Not at all
To what extent has breastfeeding affected your diabetes management?	24 (27.3)	34 (38.6)	20 (22.7)	10 (11.4)	10 (14.9)	21 (31.3)	21 (31.3)	15 (22.4)
Have you needed to check your blood glucose more during breastfeeding?	21 (23.9)	33 (37.5)	15 (17.0)	19 (21.6)	11 (16.4)	23 (34.3)	18 (26.9)	15 (22.4)
Have your blood glucose levels been more unstable during breastfeeding?	33 (37.5)	29 (33.0)	22 (25.0)	4 (4.5)	15 (22.4)	22 (32.8)	24 (35.8)	6 (9.0)
Have you experienced more hypoglycaemia during the breastfeeding period?	30 (34.1)	26 (29.5)	23 (26.1)	9 (10.2)	12 (17.9)	17 (25.4)	28 (41.8)	10 (14.9)
Have you found it more difficult to handle the diabetes during breastfeeding?	24 (27.3)	22 (25.0)	27 (30.7)	15 (17.0)	10 (14.9)	21 (31.3)	23 (34.3)	13 (19.4)

*all subjects reporting a non-missing value between 0-2 months and 2-6 months postpartum

Table 2: Experiences of diabetes management in relation to breastfeeding 0-2 and 2-6 months postpartum.

Support for diabetes management Agreement with statements n (%)	0-2 months postpartum (n= 108*)				2-6 months postpartum (n= 106*)			
	Very much	Quite a lot	Not at all	Not relevant*	Very much	Quite a lot	Not at all	Not relevant
<i>Professional support</i>								
To what extent have you experienced support from staff at the delivery ward?	22 (20.4)	33 (30.6)	33 (30.6)	20 (18.5)	-	-	-	-
To what extent have you experienced support from staff at the maternity ward?	25 (23.1)	34 (31.5)	28 (25.9)	21 (19.4)	-	-	-	-
To what extent have you experienced support from staff at the neonatal ward? **	1 (2.2)	5 (10.9)	28 (60.9)	12 (26.0)	-	-	-	-
To what extent have you experienced support from the specialist antenatal care postpartum?	19 (17.8)	26 (24.3)	19 (17.8)	43 (40.2)	5 (4.7)	13 (12.3)	13 (12.3)	75 (68.8)
To what extent have you experienced support from your regular diabetes clinic postpartum?	14 (13.0)	13 (12.0)	21 (19.4)	60 (55.6)	12 (11.5)	26 (24.5)	19 (17.9)	49 (46.2)
<i>Support from significant others</i>								
To what extent have you experienced support from your partner?	69 (63.9)	23 (21.3)	4 (3.7)	12 (11.1)	56 (52.8)	25 (23.6)	4 (3.8)	21 (19.8)
To what extent have you experienced support from your mother/mother-in-law?	24 (22.2) / 4 (3.7)	25 (23.1) / 10 (9.3)	15 (13.9) / 41 (38.0)	44 (40.7) / 53 (49.1)	0 (0.0) / 3 (2.9)	19 (17.9) / 13 (12.5)	27 (25.5) / 3 (2.9)	60 (56.6) / 85 (81.7)
To what extent have you experienced support from friends or others?	9 (8.5)	21 (19.8)	10 (9.4)	66 (62.3)	-	-	-	-

* The "not relevant" alternative includes women without a need or wish for support and/or with no contact with a care provider. ** Only 46 infants were admitted to the neonatal ward.

Table 3: Diabetes management support from professionals and significant others, 0-2 and 2-6 months postpartum.

diabetes: breastfeeding affecting diabetes management, more unstable blood glucose, and more difficulties in handling diabetes during breastfeeding. At six months, four independent variables were associated with well-being: diabetes duration, HbA1C, breastfeeding affecting diabetes management, and more difficulties in handling diabetes. The influence of breastfeeding on diabetes management was coded as 1 (very much) to 4 (not at all) (Table 5). In the multivariate regression analysis, the only independent factor remaining as explanatory for better well-being at two months after childbirth was the lesser extent to which breastfeeding influenced diabetes management (= variable¹) ($\beta_{\text{int}} = 69.43$, $SE_{\text{int}} = 3.06$; $\beta_{\text{var}}^1 = 5.58$, $SE_{\text{var}}^1 = 1.30$, $p = <0.0001$; $R^2 = 0.14$). At six months two independent factors explained better well-being; lesser influence of breastfeeding on diabetes management¹, and longer duration of diabetes (= variable²) ($\beta_{\text{int}} = 65.63$, $SE_{\text{int}} = 4.15$; $\beta_{\text{var}}^1 = 3.35$, $SE_{\text{var}}^1 = 1.21$, $p = 0.0067$; $\beta_{\text{var}}^2 = 0.47$, $SE_{\text{var}}^2 = 0.16$, $p = 0.0034$; $R^2 = 0.14$).

Discussion

The main findings in this study are that mothers with type 1 diabetes during the first six months after childbirth experience a growing exhaustion. A majority experienced considerably more unstable and lower glycaemia and increased numbers of hypoglycaemic episodes especially during the first two months. This echoes earlier studies [3,5]. It is clear that insulin requirements change considerably during

pregnancy and early motherhood. Stage et al. [6] found a lower daily insulin dose in lactating women four months after childbirth compared to pre-pregnancy doses, and a higher insulin dose in non-breastfeeding mothers. In our study, we only found differences between lactating and non-lactating mothers at six months; this might be explained by the high proportion of women breastfeeding at two months postpartum.

The multivariate regression analyses revealed that breastfeeding could negatively influence diabetes management in the mothers with type 1 diabetes. Breastfeeding has been shown to affect the response of the maternal autonomic nervous system to stressors [22], and has been associated with reduced perceived stress and negative moods in mothers in general [23]. Although we did not examine the association with stress and negative moods, breastfeeding did not seem to have such a positive effect on perceived stress and moods (measured as psychological well-being).

In this case-control study we matched for gestational week and parity. Many other factors can influence on well-being and breastfeeding in mothers with diabetes, among others the level of disease severity. The study included data on both diabetes duration and diabetes classification (Table 1) and both these variables were investigated regarding association to well-being (PGWB). Only diabetes duration was associated with well-being. Neither was occurrence of maternal complication associated with well-being (Table

PGWB score	Mothers in DG			Mothers in RG			DG versus RG	
	2 months postpartum (n= 108)	6 months postpartum (n= 108)	2 versus 6 months p value ¹	2 months postpartum (n= 104)	6 months postpartum (n=99)	2 versus 6 months p value ¹	2 months postpartum p value ²	6 months postpartum p value ²
Total PGWB score								
Mean (SD)	81.1 (13.61)	81.2 (13.35)		84.4 (10.9)	85.1 (12.4)			
Median (min-max)	84.0 (44-102)	81 (37-106)	0.952	85.0 (48-104)	87.0 (38-103)	0.180	0.173	0.016
Subscale score								
Anxiety								
Mean (SD)	18.8 (3.9)	19.2 (3.6)		19.4 (3.2)	19.9 (3.5)			
Median (min-max)	20.0 (9-25)	20.0 (8-24)	0.241	20.0 (9-25)	20.0 (4-25)	0.069	0.553	0.195
Depression								
Mean (SD)	13.6 (1.62)	13.6 (2.0)		13.5 (1.6)	13.7 (1.7)			
Median (min-max)	14.0 (7-17)	14.0 (5-15)	0.922	14.0 (7-15)	14.0 (5-15)	0.192	0.642	0.914
Positive Well-being								
Mean (SD)	12.9 (3.1)	13.2 (3.1)		13.4 (2.7)	13.6 (2.8)			
Median (min-max)	14.0 (5-18)	13.5 (4-20)	0.431	14.0 (5-19)	14.0 (6-20)	0.795	0.369	0.390
Self-control								
Mean (SD)	11.2 (1.9)	12.2 (2.3)		11.4 (1.8)	12.5 (2.2)			
Median (min-max)	11.5 (4-15)	13.0 (3-15)	<0.001	11.0 (4-15)	13.0 (2-15)	<0.001	0.772	0.265
General Health								
Mean (SD)	12.1 (2.7)	11.9 (2.7)		13.5 (2.1)	13.1 (2.3)			
Median (min-max)	13.0 (4-15)	12.0 (5-15)	0.334	14.0 (3-15)	14.0 (7-15)	0.198	<0.001	<0.001
Vitality								
Mean (SD)	11.3 (3.7)	11.2 (3.8)		12.1 (3.2)	12.4 (3.4)			
Median (min-max)	11.5 (3-18)	11.0 (3-19)	0.990	12.0 (4-19)	13.0 (1-18)	0.712	0.147	0.016

Table 4: Well-being evaluated with the Psychological General Well-Being index (PGWB) in the diabetes group (DG) and the reference group (RG).

¹Wilcoxon Signed Rank Test ²Mann-Whitney U-test

5). Surprisingly, longer duration of diabetes was found to explain better well-being at six months. Given that longer duration positively improves the degree of acceptance of the disease, a possible explanation could be that this in turn may promote women's ability to manage the transition to motherhood. A previous study on pregnant women with type 1 diabetes indicates that acceptance of one's life conditions during pregnancy is of vital importance for mastering challenges in daily life [17]. However, this needs to be further investigated in future studies.

Much has been written about the contrarious feelings that are connected with breastfeeding. It is both a deeply personal experience and a social phenomenon with embedded contradictoriness between expectations and reality. In our study it was evident that self-control in all mothers was affected during the early motherhood period (both DG and RG), and that there was an improvement over time in their mastering of daily life expressed as perceived self-control. Many women experience a sense of disillusionment and failure in relation to breastfeeding. A metasynthesis highlight that existing sociocultural discourses contributes to these feelings, and conclude that health professionals' language and practice have the potential to enhance maternal self-esteem in relation to breastfeeding [24]. Breastfeeding rates are known to be promoted by professional support, and this support should include sensitivity to individual needs and self-efficacy [25,26]. A high proportion of the mothers with type 1 diabetes in our study had experienced insufficient professional support for diabetes management after discharge from maternity care. Early initiation of breastfeeding and breastfeeding at discharge from hospital have been shown to be predictive for breastfeeding in mothers with type 1 diabetes [8], indicating that professional support in maternity care can influence breastfeeding rates in this group; just as it can for mothers in general [24-26]. The struggle of manage fluctuating glycaemic control while simultaneously establishing breastfeeding is in line with findings from previous studies in women with type 1 diabetes [13,27]. The majority of women reported that their partners had provided a great deal of support with respect to diabetes management. This indicates

that the family members of mothers with type 1 diabetes also might benefit from complementary support from diabetes care providers.

In this study, current clinical practice were in accordance with international recommendations [2]; a follow-up in maternity care within six weeks after birth. The mean time in this population for reconnecting visit at the diabetes clinic was about four months after childbirth. It is obvious that there is need for increased professional support during the first months after childbirth; including advice to adapt insulin doses.

Limitation for the Study

This explorative study has several limitations. The first is the lack of data of glycaemic control (i.e. HbA_{1c}), with a lot of missing data, especially at the two-month follow-up. This limited data probably resulted in insufficient statistical power to detect differences. The reason for this lack of data was the limited contact with health care professionals. Another limitation is that we did not collect any data on the mothers' body weight, making it impossible to report insulin doses in terms of IU/kg/24 hrs. Body weight often undergoes a fast reduction during early motherhood, which can be assumed to influence insulin requirements. Blood glucose patterns were requested in the study design but few women completed this documentation, indicating that it was not reasonable to place such demands on these already loaded women. This might explain why diabetes management during the postnatal period in women with type 1 diabetes is so poorly researched. Asking for the subjective experience of how breastfeeding had affected diabetes management was one way to explore this issue. However, the association with well-being need to be further investigated in studies with different design.

Another limitation is that the independent variables in the multivariate analyses explained only 14% of well-being at two and six months indicating that other not evaluated variables might influence well-being.

Independent variables	PGWB 2 months		PGWB 6 months	
	Descriptive data	P value	Descriptive data	P value
Educational level ^a Low* (n=47) High* (n=60)	81.0 (13.6)/ 84.0 (52-101) 81.6 (13.6)/ 84.0 (44-102)	0.809	81.2 (14.1)/ 81.0 (48-106) 81.3 (13.0)/ 82.5 (37-102)	0.922
Gestational age ^a <37 gestational weeks* (n=21) >37 gestational weeks* (n=87)	75.2 (17.0)/ 77.0 (44-98) 82.6 (12.3)/ 84.0 (52-102)	0.103	77.3 (15.2)/ 75 (37-102) 82.2 (12.8)/ 84.0 (43-106)	0.138
Parity ^a Primipara (n=58)* Multipara (n=50)*	82.0 (12.5)/ 84.0 (56-102) 80.2 (14.9)/ 85 (44-101)	0.657	82.8 (12.7)/ 80.5 (48-106) 79.8 (14.1)/ 83.0 (37-102)	0.441
Delivery mode ^a Vaginal* (n=56) Caesarean Section* (n=52)	82.6 (12.6)/ 86.0 (53-102) 79.5 (14.5)/ 83.5 (44-101)	0.290	80.9 (12.1)/ 79.5 (57-106) 81.6 (14.7)/ 87.0 (37-102)	0.410
**Maternal complications ^a No* (n=60) Yes* (n=48)	80.5 (14.4)/ 85.0 (50-102) 81.9 (12.6)/ 84.0 (44-101)	0.776	81.2 (12.2)/ 81.0 (43-102) 81.7 (14.8)/ 84.0 (37-106)	0.427
Insulin administration ^a Insulin pen* (n=81) Insulin pump* (n=26)	80.7 (13.5)/ 84.0 (44-101) 82.0 (14.2)/ 85.0 (52-102)	0.657	79.7 (14.1)/ 79.0 (37-102) 85.5 (9.7)/ 87.0 (69-106)	0.085
Diabetes duration (years) ^b (n=107)	$r_s = 0.19$	0.056	$r_s = 0.31$	0.002
HbA1c ^b 2 months (n= 62) 6 months (n= 85)	$r_s = 0.16$	0.200	$r_s = -0.23$	0.035
Insulin dose ^b (n=108)	$r_s = -0.03$	0.768	$r_s = 0.11$	0.273
***Breastfeeding affecting diabetes management ^b	$r_s = 0.39$	<0.001	$r_s = 0.31$	0.002
***Need for more monitoring during breastfeeding ^b	$r_s = 0.04$	0.678	$r_s = 0.04$	0.675
***More unstable blood glucose levels during breastfeeding ^b	$r_s = 0.23$	0.020	$r_s = 0.04$	0.689
***More hypoglycemia during breastfeeding ^b	$r_s = 0.09$	0.389	$r_s = 0.07$	0.523
***More difficult to handle diabetes during breastfeeding ^b	$r_s = 0.32$	0.001	$r_s = 0.31$	0.003

^a Mann-Whitney U-test, ^b Spearman's correlation, * Mean(SD) / Median (min-max)

** includes preeclampsia, interventions related to risk of foetal asphyxia and haemorrhage.

*** all subjects reporting a non-missing value between 0-2 months and 2-6 months postpartum (For distribution of answers see Table 2)

Table 5: Associations between independent variables and the outcome variable; total score of Psychological Well-Being (PGWB) at 2 and 6 months postpartum in women with type 1 diabetes.

Strength of this study is its holistic perspective, examining the experience of both diabetes management and well-being during breastfeeding. Objective data in terms of HbA_{1c} alone do not provide information about the subjective meaning of living with type 1 diabetes in early motherhood. Moreover, the case-control design allowed the evaluation of general psychological health and well-being in this group of women via comparison with healthy women without diabetes.

Conclusion

The findings of this study show that well-being during the first months after childbirth was associated with difficulties with diabetes management, probably due to higher degree of glycaemic instability. Diabetes management is more difficult for the mother occupied in taking care of the new-born. These conditions influence well-being in terms of general health and vitality, and there is a negative effect on well-being the more breastfeeding affects diabetes management. The findings highlight the importance of increased awareness in healthcare professionals, relatives and peers for the exhausting condition for women with diabetes in early motherhood. We suggest that the provision of professional support, including strategies to handle unstable glycaemia in relation to breastfeeding to these women, is even more important and might reduce the negative association between

diabetes management and well-being. Further research need to confirm the findings of this explorative study and evaluate supportive interventions to mothers with diabetes in this vulnerable phase of life.

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