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Depression and Oxytocin Dose: Correlation During Labor [Version 1, Awaiting Peer Review]

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Abstract

Objective: To investigate the relationship between depression during pregnancy and dosage of oxytocin required during labor.

Study Design: This cross-sectional study was conducted on 100 pregnant women in 3 different tertiary care hospitals in Karachi, Pakistan, between August and December, 2016. Depression level was evaluated by applying Patient Health Questionnaire (PHQ-9). Later on, these women were followed in the labor room to assess the dosage of oxytocin they required during labor. SPSS 16.0 was used for data entry and analysis.

Result: Study was carried out on 100 pregnant women with a mean age of 25.59±3.97. A total of 95% (n=95) of females were presented in third trimester. An oxytocin dose of 15U/L was required in women with a mean PHQ score of 10.52±2.22 while doses of 10U/L and 5U/L were required in women with a mean PHQ of 8.41±4.28 and 3.40±2.88 respectively. There was a statistically significant difference among groups as determined by ANOVA [p=<0.001] and confirmed through post-hoc tests. The strength of association between oxytocin dose and PHQ score is moderate (r = 0.425), and the correlation coefficient is significant (P < 0.001).

Conclusion: A higher dose of oxytocin was found to improve an overall performance during labor in depressed women and is useful in avoiding complications associated with prolonged labor. However, due to the small number of participants in this study, we suggest an in-depth analysis of this correlation.

Keywords

Depression; Oxytocin; Labor; PHQ

Background

Around 25-50% of patients suffering from depression are referred for its treatment primary care centers (PCC) [1,2]. Depression affects between 5% to 10% of individuals in primary care, but can only be fully diagnosed in around 50% of cases [3]. It is very common to let go off depression untreated in under-developed and developing countries due to substantial under-identification and lack of standards for medical health services leading to personal suffering and decrements in quality of life and functioning [4,5]. The presence of depression in conjunction with physical illness also adversely affects the outcome of both disorders [6]. Screening and case finding has been proposed to improve recognition and management of depression [7]. Pregnancy has been associated with many over-laying conditions like hypertension, Gestational Diabetes mellitus and post-partum psychosis. Likewise, depression can come into play during pregnancy. This was a common observation in the OPD, which led to bring the topic into consideration. Antenatal depression is more common than generally thought, and both antenatal and postnatal depression are frequently missed during routine consultation. Pregnancy-associated depression is more common where marital disharmony exists [8].

While there are many valid tools to detect depression, the patient health questionnaire (PHQ) was diagnose to use in primary care setting (PC) and provide a brief self- report diagnostic instrument for the diagnosis of mental disorders using criteria from diagnostic and statistical manual of mental disorders [9,10].

It is nine item depression module, The PHQ-9 is brief self-reported diagnostic and severity measure of depression [11,12]. Several studies report its validity, feasibility and its capacity to detect the changes of depressive symptoms over time. Additionally, PHQ-9 is increasing being use in research and clinical practice, and has demonstrated superior criterion validity with respect to the diagnosis of measure depression compared with other established depression-screening questionnaire [13,14].

In this study we applied patient health questionnaire (PHQ-9) for assessment of depression in pregnancy.

Material and Method

This cross-sectional study was conducted on 100 pregnant women in 3 different tertiary care hospitals in Karachi, Pakistan between August and December, 2016. Women of reproductive age group who were in third trimester of pregnancy, and consented to participate in study were included in the population sample. Those excluded were women with hypertension, current and previous psychiatric illness, those having elective caesarean section (CS), emergency CS and multigravida more than 3 or more. A set questionnaire was filled in Gynae and Obstetrics OPD and depression status of women is checked by applying Patient Health Questionnaire (PHQ-9) Scale on the Spot, later on these women will be followed in labor room to assess how much dose of oxytocin is given to these women during labor. Data was analyzed using SPSS version 16 to calculate frequencies of different variables and cross tabulations.

Results

The mean age of women in our study was 25.59±3.97. About 95% (n=95) of females were presented in 3rd trimester with 14% (n=14) having previous history of hypertension. Due to discrepancies in the data collection 29 patients were categorized as undetermined [Table 1]. There was a statistically significant difference noted for dose of oxytocin required for each mean PHQ score among groups as determined by ANOVA [p=<0.01] which was confirmed through post-hoc tests [Table 2]. The strength of association between the variables is moderate (r = 0.425), and the correlation coefficient is significantly different from zero (P < 0.001) [Figure 1].

Table 1: Prevalence of complication in pregnant women.

Variable	Response	Frequency (n)	Percentage (%)
Trimester	2nd trimester	5	5
	3rd trimester	95	95
Gravidity	Primary	79	79
	Secondary	21	21
Family history of	Yes	69	69
depression	No	31	31
Complications during	None	73	73
pregnancy	Diabetes	13	13
	PIH	7	7
	Eclampsia	5	5
	Infection	2	2
Previous disease >3	Hypertension	14	14
months	Diabetes	2	2
	None	84	84
Drug history > 3months	Aldomet	11	11
	Other	2	2
	None	87	87

Table 2: Frequency comparing oxytocin dose and PHQ score.

Oxytocin Dose	Number of Patients (N)	Mean PHQ Score	Std. Deviation
5 U/L	5	3.40	2.881
10 U/L	41	8.41	4.289
15 U/L	25	10.52	2.220
Total	71	8.80	3.988
P-Value			<0.001

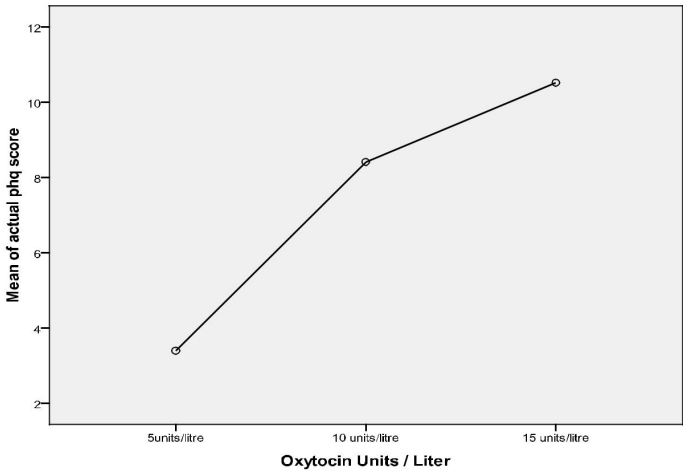

Figure 1: Graph showing a correlation between PHQ square and oxytocin dose during labor.

Discussion

Our study was conducted in a tertiary care hospital on women going through the process of labor. Our study is among the first few studies to provide an association between depression during pregnancy and the requirement of oxytocin dose. Pregnancy has been associated with many over-laying conditions like hypertension, Gestational Diabetes mellitus and post-partum psychosis. Likewise, depression can come into play during pregnancy. This was a common observation in the OPD, which led to bring the topic into consideration. Various complications can emerge as pregnancy progresses. There can be risk factors behind the development of these complications such as family history, personal history [15], and occurrence of disease during pregnancy [16] or any drug taken during the course of gestation that might impose a depressive effect. There are many reasons for the increased prevalence of depression during pregnancy. Most women welcome pregnancy but it is also a major physiological and psychological life event. Women who are coping with other more chronic life stressors may find the additional stress of pregnancy unmanageable. Pregnancy also carries specific demands that individual women may have difficulties with, such as impending motherhood if she has had poor parenting herself or if she has been sexually abused as a child [17]. Antenatal depression is more common than generally thought, and both antenatal and postnatal depression are frequently missed during routine consultation. Pregnancy-associated depression is more common where marital disharmony exists [8]. Antenatal depression may have a specifically harmful influence on development of the central nervous system. A large Danish study (n=20 299 pregnancies) reported that an unexpected death during the first trimester was associated with an adjusted odds ratio of 8.36 (95% confidence interval 2.41 to 29.0) for cranial neural crest malformations in the babies born to these women [18]. This suggestion of a specific effect of maternal stress on brain development is supported by the finding of higher levels of behavioral disturbance at four years in children born to women with high anxiety scores during pregnancy [19].

Studies have suggested that it is the complex hormonal cycles occurring during pregnancy which makes them more vulnerable to onset of depression. A prominent endocrine cycle variation occurs at the level of hypothalamus-pituitary-adrenal (HPA) axis making them a target of various anti depressive therapies [20].

The oxytocin secretory activity also changes in response to various stress stimuli acting on HPA axis [21]. Buckwalter et al conducted a study to find out the effect of various hormones on the mood and cognition of women presented between two months pre-labor to two months post-labor suggesting role of various hormones, steroids in particular, in mood and behavioral disturbances during pregnancy [22].

Depression was assessed by using PHQ-9 scale, which due to its concision and validity is an effective instrument for evaluate the severity of depression [14]. Our study indicated a need of augmentation in oxytocin dose with increasing level of depression. This outcome is in slight correspondence to a study conducted in Switzerland which predicted an association of low levels of oxytocin during pregnancy to development of post partum depression [23].

Our study proposed that the strength of association between oxytocin dose required during labor and depression during pregnancy was moderate (r=0.425) identical to a study conducted Bell et al in sixty depressive patient establishing a significant correlation between plasma oxytocin levels and Reward Dependence personality dimensions [24].

Oxytocin perhaps known for its role in induction of labor, lactation and prevention of uterine atony after caesarian section [25] also has implications in social affiliation and interaction affecting behavior response of an individual. A study suggested that level of oxytocin may correlate with emotional stimuli. An increase in oxytocin concentration was found in relaxing stimuli and a decreased concentration following depressive stimuli [26]. Various studies conducted on animal models led to conclusions that oxytocin might influence normal behavioral responses in humans and a disruption in its symptoms

could lead to neuropsychiatric dysfunctions [27]. Arletti et al also conducted a behavioral despair study in mice thus presenting with result in correspondence to the new behavioral role of oxytocin with its implication in humans, supporting the role of oxytocin as a CNS regulatory peptide [28]. In contrast to our finding, a preliminary study conducted in California depicted an in increase in oxytocin level during depression consistent with increase in OT expressing neurons and mRNA in individual with depression [29]. On the other hand, Ozsoy et al reported a decrease in levels of oxytocin before and after treatment of depressive patients [30]. However, the possible implications of the same mechanisms in pregnancy were not discussed.

To expand our knowledge about the possible association of oxytocin dose and depression during gestation, further advances in methodology is necessary. A use of more sophisticated method and neuroimaging with simultaneous tracking of hormonal levels will bolster the strength of our hypothesis. Additionally, increasing the sample size, and study centers may also help to bolster the association.

Conclusion

A higher dose of oxytocin was found to improve an overall performance during labor in depressed women and is useful in avoiding complications associated with prolonged labor. However, due to the small number of participants in this study, we suggest an in-depth analysis of this correlation.

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