Abstract:

Oxytocin is a hormone produced by the posterior pituitary gland. It has a number of peripheral actions mediated by specific oxytocin receptors. The peripheral actions of oxytocin include uterine contractions during labour, excretion of milk during breast-feeding, role in sexual arousal, wound healing and behavioural control. The uterine contracting properties of oxytocin were discovered by British pharmacologist Sir Henry Hallett Dale in 1906. The milk ejection property of oxytocin was described by Ott and Scott in 1930 and by Schaffer and Mackenzie in 1931. In 1953, the chemical structure of oxytocin was elucidated almost simultaneously by DuVigneaud and associates in the United States and by Boissonnas and Tuppy in Austria. In the following year, DuVigneaud was able to synthesize oxytocin and, in 1955, Boissonnas evolved a method of manufacturing synthetic oxytocin on a commercial scale. In regards to parturition, synthetic oxytocin is used for induction and acceleration of labour, delivery of the placenta and management of postpartum haemorrhage.

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Methods

Eight infusion bags were prepared by mixing 10 IU of oxytocin in 1 litre of 0.9% saline. The infusion bags were then hung on infusion stands for 8 hours after which 10 samples of 100 mls of the solution from each bag were taken in different containers and the concentration of oxytocin calculated using oxytocin specific Enzyme Immunoassay (EIA) in the different samples. We postulated that with time, there may be settling of the molecules such that oxytocin concentrates at the bottom of the infusion bag. Eight infusion bags were prepared by mixing 10 IU of oxytocin in 1 litre of normal saline. The infusion bags were then hung on infusion stands for 8 hours after which 10 samples of 100 mls of the solution from each bag were taken in different containers and the concentration of oxytocin calculated using oxytocin specific Enzyme Immunoassay (EIA) in the different samples. No statistically significant correlation between the oxytocin concentration and the sample number in each bag. There was no evidence to suggest that a linear oxytocin concentration gradient develops in a bag of normal saline over an 8-hour period. In fact the distribution appears to be random and unequal.

Results

Casual inspection of the raw results failed to show any discernable pattern. The distribution of oxytocin concentration has been plotted on the graph (Figure 1). This shows a wide fluctuating oxytocin concentration from each sample in each bag without any obvious pattern. One would expect the distribution to be a straight line (homogenous distribution), but this was not the case. There was no obvious correlation between the sample number and the oxytocin concentration. The data was formally analysed with R version 2.11.1. Pearson product–moment correlation coefficient between oxytocin concentration and sample number was 0.34 (p-value = 0.74). This indicates a statistically insignificant positive correlation between oxytocin concentration and sample number.

Discussion

Labour dystocia is a common indication for delivery by cesarean section. There is continuing research into the causes and treatment of labour dystocia. In majority of cases, labour dystocia is corrected with oxytocin infusion. Our theory that oxytocin may settle at the bottom of an infusion bag was an important possibility to confirm or refute. However, the results of our experiment do not support our hypothesis that oxytocin settles to the bottom of a bag when left hanging for prolonged periods of time. The data actually displays a very weak, statistically insignificant increase in oxytocin in later samples. More importantly, our experiment shows a widely fluctuating concentrations of oxytocin in a bag of normal saline over an 8-hour period.

Oxytocin is Unequally Distributed in a Bag of Normal Saline – True or False?

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