ARTIFICIAL SWEETENERS - DO THEY BEAR AN INFERTILITY RISK?

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INTRODUCTION

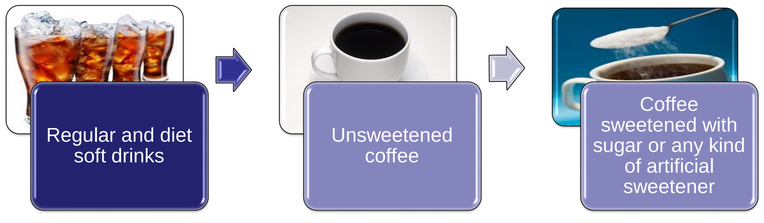
Considering that the human fertility rate has declined over time, it could be argued that eating habits, including the consumption of sugar and artificial sweeteners, may negatively contribute to fertility potential. In fact, a positive association between the intake of artificially sweetened soft drinks and the risk of preterm delivery has been previously demonstrated in two epidemiological studies. To date, the association between the consumption of sweeteners and human assisted reproduction has never been investigated.

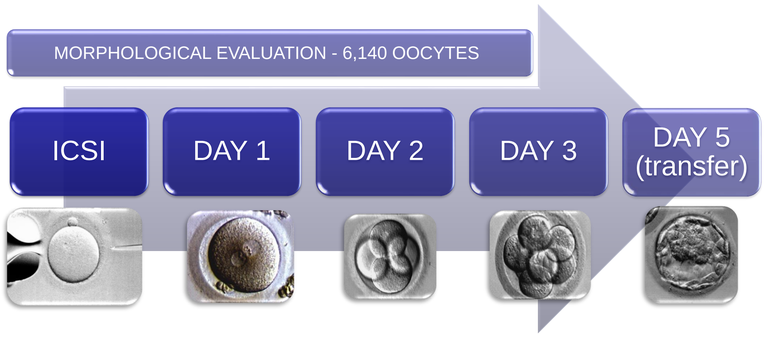
OBJECTIVE

To investigate if the oocyte quality and intracytoplasmic sperm injection (ICSI) outcomes are influenced by the consumption of soft drinks and coffee, sweetened with sugar or artificial sweeteners.

MATERIALS AND METHODS

- Prospective cohort study
- 602 patients undergoing ICSI cycles from Jan/2012 to Dec/2014
- Patients were interviewed face-to-face by the same nutrition professional before the beginning of the treatment
- Women were asked about the frequency of consumption of:





Binary and linear regression analyses were used to investigate the influence of dietary habits on:

- Oocyte quality
- Embryo quality on days 2 and 3
- Blastocyst formation
- Implantation
- Clinical pregnancy rate
- Miscarriage rate

RESULTS

Variables	Values
Injected oocytes	8.0 ± 6.3
Fertilization rate	75.2 ± 25.1
Embryos	6.8 ± 5.6
High quality embryos	2.3 ± 3.2
D2 (%)	1770/3192 (55.4)
D3 (%)	1858/3192 (58.2)
Blastocyst formation (%)	518/1136 (45.6)
Embryos transferred	2.1 ± 1.0
Non-transferred cycles (%)	36/524 (6.9)
Clinical pregnancy rate (%)	155/488 (31.8)
Implantation rate (%)	231/1025 (22.5)
Miscarriage rate (%)	26/155 (16.8)

Table 1. ICSI outcomes

Variables	Oocyte quality	Embryo quality on D2	Embryo quality on D3	Blastocyst formation
Regular soft drink	aOR: 0.61 CI: 0.50-0.82 p= 0.032	aOR: 0.57 CI: 0.19-1.74 p= 0.320	aOR: 0.57 CI: 0.27-1.17 p= 0.124	aOR: 1.06 CI: 0.50-2.22 p=0.882
Diet soft drink	aOR: 0.47 CI:0.33-0.58 p= 0.026	aOR= 0.67 CI= 0.56-0.85 p= 0.035	aOR= 0.69 CI= 0.52-0.94 p= 0.039	aOR: 0.82 CI: 0.65-1.03 p= 0.090
Unsweetened coffee	aOR: 1.03 CI:0.35-3.03 p=0.951	aOR: 0.82 CI: 0.28-2.41 p= 0.713	aOR: 1.00 CI: 0.34-2.93 p> 0.999	aOR: 0.71 CI: 0.26-1.94 p= 0.499
Coffee with sugar	aOR: 0.89 CI: 0.77-0.94 p= 0.049	aOR: 0.64 CI: 0.31-1.32 p= 0.222	aOR: 0.74 CI: 0.36-1.52 p= 0.409	aOR: 0.99 CI: 0.79-1.25 p= 0.954
Coffee with artificial sweetener	aOR: 0.51 CI: 0.25-0.76 p= 0.028	aOR= 0.68 CI= 0.54-0.88 p= 0.033	aOR= 0.68 CI= 0.59-0.95 p= 0.035	aOR: 0.83 CI: 0.65-1.05 p= 0.113

Table 2. Binary and liner regression analyses' results for the association between the consumption of soft drinks and coffee, and ICSI laboratory outcomes.

Variables	Implantation	Clinical pregnancy	Miscarriage
Regular soft drink	RC: 5.356 r^2: 0.3% p= 0.239	aOR: 0.95 CI: 0.59-1.54 p= 0.843	aOR: 0.79 CI: 0.34-1.85 p=0.590
Diet soft drink	RC: -0.898 r^2:3.5% p= 0.063	aOR= 0.91 CI= 0.87-1.01 p= 0.065	aOR: 1.31 CI: 0.26-6.64 p= 0.742
Unsweetened coffee	RC: 2.881 r^2: 0.1% p= 0.525	aOR: 1.01 CI: 0.62-1.63 p= 0.972	aOR: 0.87 CI: 0.18-4.34 p= 0.870
Coffee with sugar	RC: 3.389 r^2: 0.1 p= 0.461	aOR: 1.05 CI: 0.65-1.70 p= 0.847	aOR: 0.64 CI: 0.27-1.49 p=0.296
Coffee with artificial sweetener	RC:-0.911 r^2:4.8% p= 0.058	aOR= 0.93 CI= 0.81-1.02 p= 0.067	aOR: 1.08 CI:0.46-2.51 p= 0.859

Table 3. Binary and liner regression analyses' results for the association between the consumption of soft drinks and coffee, and ICSI clinical outcomes.

CONCLUSION

The consumption of soft drinks and artificial sweeteners, but not coffee, negatively affects oocyte quality and ICSI outcomes. The general population believes that artificial sweeteners are healthier than regular sugar, and is not aware of the dangers hidden behind the promise of reduced calorie food and beverages. Patients should be advised about the adverse effect of sugar and mainly artificial sweeteners on the success of assisted reproduction.