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## Arousal response of (Olfaction effect) intranasal oxytocin on blood pressure of students in Erbil City, Iraq

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### Abstract

**Objective:** This study was designed to evaluate the role of Oxytocin, a commercial synthetic hormone, on the blood pressure of normal students who volunteered to become a part of this study.

**Materials and methods:** A rapid sensitive Digital blood measuring meter is used for the measure of blood pressure among young students of Iraq. To support the current study, evaluation of sodium concentration in drinking water, temperature and Precipitation rate of city were also reported.

**Result:** We found that elicited synthetic Oxytocin hormone arousal has an effect resulting in a decrease in systolic and diastolic pressures in young students. The mean age of students is 20 years. Before olfaction oxytocin the average Systole blood pressure was 118.9 after arousal effect the average Systole blood pressure is 112. Intranasal Oxytocin olfaction response also decreases the heart pulse rate among young students.

**Conclusion:** Now a days hypertension has become a global challenge. To decrease blood pressure and heart pulse rate slightly, a small quantity of commercially available oxytocin hormone is a helpful tool.

**Keywords:** Hormone, Middle East, Systole & diastole, Heart pressure.

### 1. Introduction

The main aim of this study is to determine the arousal effect of oxytocin on blood pressure and behavioral states of students. Odors are important for humans to attract the opposite sex of the same species [1]. Oxytocin is an hormone present in the brain, it has an effect on uterine contraction [2] and milk ejection as reported by many [3]. In a few studies its effect on rats has also been analyzed [4]. Oxytocin is also associated with emotional function in an individual [5, 6].

Oxytocin hormone plays an important role in cardiovascular homeostasis system by regulating blood volume via atrial natriuretic peptide release from cardiac atria [7, 8] and reducing heart contractility [9]. But the quantity of synthetic commercially available oxytocin, which is inhaled, evokes or alters the blood flow inside the body of student's ducts, especially those who are familiar with many arousing odors is still an unresolved dilemma. Another question arises can we use artificial synthetic oxytocin as an artificial pheromone because previous studies show that natural oxytocin is a pair bonding hormone [10]. Cosmetic and perfume industries show a great interest towards artificial pheromone making techniques.

Born J *et al.* has suggested that intranasal administration of neuropeptides can bypass the bloodstream and direct access to the brain in both men and women [11]. It means that Olfaction response of oxytocin activates the brain and in response to blood pressure fluctuations, we easily measure, without disturbing the internal body composition with the help of blood pressure measuring gadget. Studies on mammals suggest that greater oxytocin releases in females in response to threat as compared to males [12]. The effect of Oxytocin arousal on central nervous system and reduce stress activation is presented by Fehm-Wolfsdorf *et al.* [13].

Brain and circular system are linked by bidirectional pathways it means that changes inside the central nervous system may influence various functions in the human body. The effect of odors on blood flow, Skin are studied by multi authors [14, 15].

There are multiple physiological mechanisms implicated in the maintenance of normal blood pressure and their derangements may have a role in the development of high and low blood pressure. Different types of diet plays a crucial role inside the body to alter blood pressure. External environment is also equally important, just as it can make blood pressure fluctuate.

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Dryness and humidity in weather is also a non ignorable factor during study. Water loss through sweating impacts the body in various ways, including a decrease in blood pressure. Franklin SS *et al.* reported that age is also an important cardio factor during study of heart pressure measurement [16].

Janan J. Toma *et al.* reported the drinking water quality of Four brands of bottled water i.e Al-Hayat, Life, Kani and Pearl [17]. Its composition indicates that sodium is in accepted range. In commercial available water it is possible to alter the composition of cations and anions.

Study of Aziz and Al-Dabagh [18] shows the sodium (0.9–43.6 mg/l) concentration in dust of Erbil city, which directly or in directly affects the survival of land. The sodium and potassium ratio in diet is an important factor in the prevention of high blood pressure. Potassium depresses and low Concentration of sodium enhances blood pressure [29]. Siraj M. A. Goran in 2010 tells us that potassium concentrations were lower than sodium in drinking water treatment plant of city [19], which is ideal to enhance the blood pressure. According to rough estimates 50 percent of citizens of the Kurdistan Region have been facing hypertension related problems now a days [20].

### 1.1 Location

Experiment was conducted inside the University of Kurdistan, Hewler (Erbil), Iraq region which is located in the heart of Erbil province of the country at coordinates 36°11'28"N 44°0'33"E. Different types of tribes live in the city, but the city is overwhelmingly Muslim. Usually females and male students of the city avoid smoking and alcohol. Smoking increases significantly the risk of impairment of olfactory function [21]. Therefore the current location is ideal for conducting the study. We selected a group of 15 young students. During adulthood Olfaction response is at its Peak [22]. The selected students are studying Natural resources engineering, the reason behind the selection criteria is that the students of the department are working with minerals, ores and field survey makes them capable of differentiating anthologized kinds of smells easily. During the month of April 2013 the average weather conditions of the location are as follows the average Precipitation rate was 1.85 mm and the average temperature during study was 14.5–22.4 °C [23] as shown in table 1. Experiment was performed in an open surrounding [24].

### 1.2 Nomenclature

The molecular weight of the compound is 1007.18734 [g/mol]. Oxytocin is a peptide of nine (9) amino acids. Its systematic name is cysteine-tyrosine-isoleucine-glutamine-asparagine-cysteine-proline-leucine-glycine-amine (cys – tyr – ile – gln – asn – cys – pro – leu – gly - NH<sub>2</sub>, or (CYIQNCPLG-NH<sub>2</sub>). The molecular formula C<sub>43</sub>H<sub>66</sub>N<sub>12</sub>O<sub>12</sub>S<sub>2</sub> [28]. oxytocin brought from Interchemie Holland.

## 2. Method and material

### 2.1 Selection criteria

To avoid human error and represent data on the basis of the merit Random generation method is used. From the group of eighty five students, only 15 students are selected for study. Females have a better sense of smell as compared to males [22]. Verbal interview about their marital status were ask, all the students are single at the time of study.

### 2.2 Cardio Blood pressure Measurements

We use BEURER GMBH STR.218 Germany. Digital blood pressure meter which is based on an oscillometric method for

measuring blood pressure [25]. This means the monitor detects human heart blood movement through heart brachial artery and converts that movement into a digital reading, which gets displayed on the screen of meter. As described by the vendor of gadget, before starting the measurement they are allowed to sit in a relaxed position for five minutes. After this students are allowed to inhale oxytocin one by one for 10 - 20 seconds (five – ten breaths) after which we once again measure the blood pressure. To avoid the arousal effect of oxytocin dispersed during inhaling, and its affect on other participants before measuring blood pressure we take reading one by one.

### 2.3 Measurement of precipitation

Using cylinder gauge Method, Calculate the rainfall (in mm) by dividing the volume of water collected by the area of the opening of the cup.

### 2.4 Diet management

To make the study uniform there is also a need to manage the calorie intake of each female. For this purpose we prescribed a diet for one day before measuring their blood pressure. We can use Metabio calc v.1.0 a calculator (computer software) use to record information about the (diet) calorie intake before experiment through asking questions. This software is based on Harris and Benediet two step formulas to manage diet.

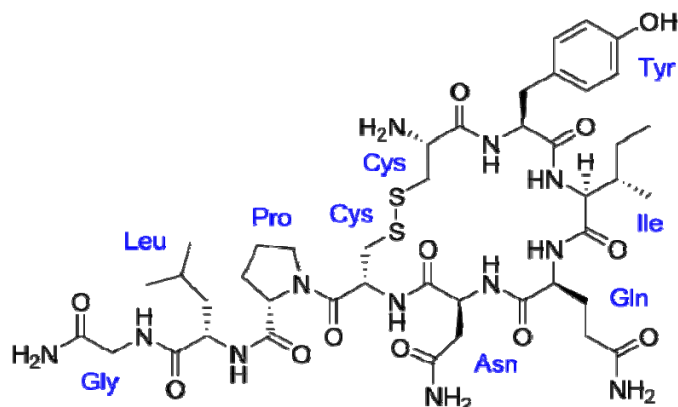
### 2.5 Statistical analysis

Data obtained from the above mentioned parameter was subjected to statistical analysis through Statistical package for the social sciences (personal computer software version 14 s.p.s.s).

## 3. Result and discussion:

**Table 1:** Show the average temperature and precipitation rate of experimental location.

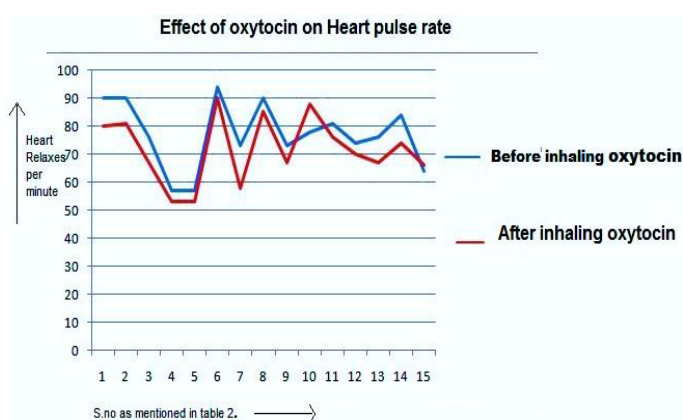
Date April 2013	Temperature (°C)		Precipitation (mm)
	Min	Max	
4	16	29	0.2
5	13	21	6.7
6	16	22	0.1
7	17	22	0.2
8	16	22	0.2
9	13	22	0.1
10	14	22	0.1
11	13	22	1.6
12	13	20	7.4
Mean Of 9 days	14.5	22.4	1.85



**Fig 1:** Show the structure of oxytocin synthetic hormone. [27]

**Table 2:** Show the arousal effect of synthetic oxytocin hormone on male and female Blood pressure.

S. No	Age of student	Before smell oxytocin Blood pressure			After smell oxytocin Blood pressure			Gender
		Systolic	Diastolic	Pulse rate	Systolic	Diastolic	Pulse rate	
1	20	80	51	90	79	49	80	Female
2	20	96	58	90	85	53	81	Female
3	21	92	62	76	82	53	67	Female
4	21	179	143	57	170	138	53	Female
5	21	179	143	57	174	139	53	Female
6	21	156	111	94	150	106	90	Male
7	21	113	53	73	105	47	58	Male
8	21	107	72	90	102	67	85	Male
9	21	115	74	73	110	70	67	Male
10	21	119	75	78	109	64	88	Male
11	21	94	47	81	89	44	76	Male
12	21	124	72	74	120	68	70	Male
13	21	105	78	76	97	71	67	Male
14	21	108	76	84	103	63	74	Male
15	21	117	67	64	110	56	66	Male
Mean	20	119	79	77	112	72	71	



Y-axis heart pulse rate, while X-axis no of cases record during study.

**Fig 2:** Graphical presentation of oxytocin effect on heart pulse.

### 3.1 Heart pulse rate

Human heart pulse gives many important information about health. Any change in normal heart rate can indicate a medical condition. Greater pulse rate is an alarming signal of an infection or dehydration. The pulse rate also gives information about fitness level and health. Pulse pressure measurement, an easily measurable correlate of pulsatile hemodynamic load, is an independent predictor of risk of congestive heart failure in this elderly cohort [26].

### 3.2 Blood Pressure

Blood pressure (B.P) measurement information is also indirectly profound physiological sequel of arterial stiffness.

### 4. Conclusion and hypothesis

So on the basis of scientific study, we came to the conclusion that synthetic oxytocin hormone arousal effect on students disturbed their heart rhythm and decrease blood pressure slightly. Further research is needed to determine oxytocin arousal influence on human with physiological mechanisms inside the autonomous nervous system. It is stated that the student brain is more developed than an illiterate human brain. And these things make them capable to easily differentiate different kinds of odors, heart pulse rate also reflect the national daily workout information usually people who do daily physical work, often have lower heart rates, the reasons is that their heart muscle is in better condition and doesn't need to work as hard to maintain a steady beat. It is proves

oxytocin can be used for to slow down hypertension if small quantity of oxytocin is added in body sepray than the patient with hypertension fell relaxes and comfort.

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