
Ear, nose and throat changes observed during three trimester of pregnancy

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Abstract: Aim: To evaluate frequencies and distribution of ear, nose, throat symptoms during pregnancy. Materials and Methods: The study population consisted of 40 pregnant women and 40 non-pregnant women who applied clinics of Otorhinolarıngology and Obstetrics. Pregnant women were evaluated each trimester and after birth. Results: Results in pregnant group were as follows: Sensation of blockage in ears (15% in first trimester , 25% in second trimester, 30% in third trimester and 17.5% after birth), hearing loss (2.5% , only 1 patient in third trimester), facial paralysis (2.5% , only 1 patient in third trimester), stuffiness (7.5% in first trimester , 15% in second trimester, 20% in third trimester and 5% after birth), olfactive sensitivity (5% in first trimester , 30% in second trimester, 33% in third trimester and 10% after birth), gum bleeding (25% in first trimester , 30% in second trimester, 33% in third trimester and 5% after birth), epulis (2.5% , only 1 patient in second trimester), change in taste (37.5% in first trimester , 20% in second trimester, 17.5% in third trimester and 2.5% after birth), hoarseness (12.5% in first trimester , 17.5% in second trimester, 22.5% in third trimester and 5% after birth), dysphagia (20% in first trimester , 40% in second trimester, 45% in third trimester and 2.5% after birth), regurgitation (25% in first trimester , 37.5% in second trimester, 50% in third trimester and 2.5% after birth), facial pigmentation (10% in first trimester , 11.25% in second trimester, 30% in third trimester and 30% after birth). In control group, symptoms were sensation of blockage in ears (12.5%), stuffiness (5%), olfactive sensitivity (5%), gum bleeding (5%), change in taste (2.5%), hoarseness (5%), dysphagia (2.5%), regurgitation (7.5%), facial pigmentation (7.5%). There were no hearing loss , facial paralysis and epulis in control group. Conclusion: Pregnancy changes ear, nose, throat symptoms and these symptoms may differ according to trimesters. While incidence of symptoms increased as pregnancy progresses, incidence of symptoms decreased after birth.

Keywords: Pregnancy, Trimester, Ear, Nose and Throat Changes

1. Introduction

Pregnancy is a quite complex period characterized by significant physiological changes. Some of these changes may be due to various protein and steroid structured hormones produced by fetoplacental unit and increased activity of maternal pituitary, thyroid and adrenal glands. While Protein structured placental hormones are human chorionic Gonadotropin (hCG), Human Placental Laktogen (HPL), Human Somatomammotropin, Human

chorionic Thyrotropin and Human chorionic corticotropin; steroid ones are Progesteron and Estrogen. hCG levels reaches its highest level between 10-12 weeks of pregnancy and remains in high level during pregnancy. Progesteron and estrogen levels rise during first and second trimesters and remain constant during third trimester. The role of hormones on physiological, immunological and inflammatory response is not completely understood.

Hormones secretion of maternal pituitary, thyroid and adrenal glands change during pregnancy. These hormone levels are associated with pregnancy complications (1).

Ear, nose and throat(ENT) changes observed during pregnancy are thought to be result of female sex hormones as well as infection, stress and allergy. Sex hormones might increase H1 receptor expression on nasal epithelium and microendothelial cells and have an effect on nasal symptoms via histamin receptors(2). Recent studies on cytokines propose the role of interleukins on nasal physiological changes related to pregnancy(3,4). Air taken from nose carries nitric oxide(NO) from sinonasal area to lung and cause vasodilatation(5). Nasal congestion bring about mouth respiration and patient become devoid of nasal function. Mouth respiration leads mouth dryness and decreases salivary secretion causing tooth decay. Nasal congestion in long term may provoke sinusitis. Symptoms of pregnant rhinitis are similar to allergic rhinitis(AR) such as daytime fatigue, thirst, decreased concentration and headache(6). Nasal congestion in rhinitis increases in supine position and cause snore(7). Air passing through nose becomes appropriate for lung via cleaning from particles, adjusting temperature and humidifying.

Air passing through nose is transmitted to middle ear via eustachian tube. Eustachian tube discharge fluid accumulation from middle ear to nasal passage. Estrogen secreted during pregnancy increases vascularization on nasal mucosa which may cause ear blockage. Vascularization and accompanying edema on nasal mucosa may cause dysfunction and closure of entrance of eustachian tube. When air passing to middle ear decreases, negative pressure occurs in middle air leading to ear fullness, pressure, tinnitus and hearing loss(8).

Heartburn, the most common symptom of gastroesophageal reflux(GER) is seen in 2/3 of pregnant. Decreased lower esophageal sphincter via increased progesterone and estrogen hormones during pregnancy is the main reason of GER. Mechanical factors as well as hormonal ones may contribute GER. Life style modifications such as avoiding food that provokes GER and raising the head of the bed are useful to prevent GER(8).

The aim of this study is to evaluate frequency and distribution of ENT symptoms according to trimesters in pregnant women.

2. Materials and Methods

This study was performed in department of Otorhinolaryngology along with obstetrics and gynecology clinic between January 2013- January 2014. The study population consists of 50 pregnant women and 40 women as a control group. Of 10 pregnant women were excluded from study because of abortus and not coming follow-up. Exclusion criteria for all women were smoking, having chronic nasal and sinus problem and symptoms of acute upper respiratory infection other than nasal congestion and history of AR(Allergic Rhinitis). All pregnant women had

ENT examination by the same physician in each trimester and in second week of postpartum period. Control group had ENT examination also. Symptoms such as sensation of blockage in ears, sudden hearing loss, facial paralysis, stuffiness, olfactive sensitivity, gum bleeding, epulis, change in taste, hoarseness, dysphagia, regurgitation and facial pigmentation were questioned. Written consent forms were taken from all women and the study was approved by local ethic committee.

Table 1. pregnant women who were enrolled in the study and control groups, the average age of

	Mean age
Pregnant	28,4±7,61
Control group	28,4±7,61

Table 2. ENT changes before and after pregnancy be evaluated together with the control group

	Tri1	Tri 2	Tri 3	Post-partum	CH
Sensation of blockage in ears	15,2%	25%	30%	17,5%	12,5%
Sudden hearing loss			2,5%		
Facial Paralysis			2,5%		
Stuffiness	7,5%	15%	20%	5%	5%
olfactive sensitivity	5%	30%	33%	10%	5%
Gum Bleeding	25%	30%	33%	5%	5%
epulis				2,5%	
Change in taste	37,5%	20%	17,5%	2,5%	2,5%
Hoarseness	12,5%	17,5%	22,5%	5%	5%
Dysphagia	20%	40%	45%	2,5%	2,5%
Regurgitation	25%	37,5%	50%	2,5%	7,5%
Facial hyperpigmentation	10%	11,25%	30%	30%	7,5%

Tri:trimester,CH:control group

3. Statistical Analysis

Continuous variables are expressed as mean+standard deviation. Categorical variables are expressed as

percentages. To compare parametric continuous variables, the Student t test was used; to compare nonparametric continuous variables, the Mann-Whitney U test was used; and to compare categorical variables, the chi-square test was used. Two-tailed P values <.05 were considered to indicate statistical significance. Statistical analyses were performed using SPSS, version 15.0 for Windows.

4. Results

While the mean age of pregnant women was $28,4 \pm 7,61$, the mean age of control group was $29,25 \pm 7,29$ (Table1). The distribution of symptoms in pregnant women according to trimesters, postpartum and in control group were given in Table2.

There was statistically significant difference in examination results of pregnancy and postpartum period ($p < 0.01$). While incidence of symptoms in 3. Trimester were higher than 2. trimester ($p < 0.05$), incidence of symptoms were decreased in postpartum period ($p < 0.01$).

5. Discussion

Nose is responsible for more than half of respiratory system resistance and passage of air to lower respiratory tract. Airflow in nasal cavity exhibit different characteristics according to location, inspiration, expiration, resting state and exercise. Nasal valve, the narrowest part of nasal passage, is the one of the most important area of nasal passage. Nasal airflow cause the most negative air pressure in this area and alar collapse is observed. Blood vessels on nasal mucosa control nasal airflow and resistance. Venous sinusoids on mucosa especially on lower concha are under the control of autonomic nervous system. While Activation of sympathetic nervous system cause nasal decongestion, activation of parasympathetic nervous system cause nasal congestion. Blood vessels in nose are normally under the control of sympathetic vasoconstrictor tonus effect. Primarily norepinephrine along with neuropeptide Y and pancreatite polypeptide are the major neurotransmitters of sympathetic system. Parasympatetic system has vasomotor effect and responsible for glandular secretion. Acetylcholine is the major transmitter of parasympathetic system. Nasal inflammatory diseases like rhinosinusitis and allergic rhinitis, hormones, pregnancy and sexual activation may change nasal cycle.

Estrogen and progesteron which might have an effect on nasal mucosa increases as pregnancy progresses. Because of this, nasal congestion is expected to increase toward birth(9,10). Bowser et al. Proposed that fibroblasts on nasal mucosa and as a consequence extracellular matrix were affected from progesteron(11). It has been suggested that stuffiness during pregnancy could be result of neurotransmitters like substance P whose secretion changes via estrogen and progesteron. Furthermore ,

vasoactive intestinal peptide is proposed to have an impact on pregnancy rhinitis but it has not been proven(15). Ellegard and Karlsson detected that placental growth hormone levels were increased in pregnant women and estrogen were thought as having cholinergic effect (12,13,14). Although nasal congestion is often seen in pregnancy, pregnancy rhinitis which is seen 8-32% of pregnant women have been described lately(16). In our study, complained of nasal congestion is up to 20% with gestational age.

Estrogens during pregnancy by increasing vascularity in the nasal mucosa can cause ear blockage. The edema in the nasal mucosa cause the closure of the Eustachian tube. When the amount of air in the middle ear reduces it causes to the negative pressure in the middle ear and resulting fullness in the ear, congestion, pressure sensation, can cause tinnitus and hearing loss (6). In our study complained of ear congestion with gestational age increases up to 30% in the 3rd trimester and hearing loss were found only 2.5% in the 3rd trimester in pregnant women. Also during pregnancy with edema and supression of immune system; the herpes virus causes the edema at facial nerve canal and have a negative effect on facial muscles therefore the facial paralysis risk is 2-3 times higher, and usually in the later stages of pregnancy. In our study, 2.5% in pregnant facial paralysis was observed only in the 3rd trimester.

Gingival hyperemia is seen in almost all pregnant women in varied severity and sometimes accompanied with gingivitis. Local irritation and lack of oral hygiene during pregnancy may cause gingival hyperemia(17). In pregnant women compared to non-pregnant individuals plaque accumulation and gingival inflammation are seen as more severe occurring due to lack of oral hygiene. During this period, bleeding gums during brushing or spontaneously change color or redness, swelling, softening and even local gingival overgrowth may occur called epulis. In our study with gestational age gingival bleeding was observed rates of up to 33%, epulis were detected in only 2.5% cases in the postpartum period .

At the beginning of pregnancy increase estrogen released from the placenta, the sensitivity of the sense of smell increases in mother. Hormones estrogen and progesterone increasing sensitivity in the brainstem in "chemoreceptors activating region" and allows for the discovery of the very little amount of toxin present in blood. This area of the brain becomes aware of toxins in the blood, stimulates feelings of nausea and vomiting. Of bacteria called *Helicobacter pylori* also thought to have a serious role in the emergence of nausea and vomiting. In our study of olfactory sensitivity in women was more frequent with increasing gestational weeks. Taste and smell of the close connection and also increasing of estrogen in pregnancy because of the sense of smell is related changes as metallic taste (dysgeusia). Unlike the other findings in our study, the taste changes most

frequently at first trimester 37.5% in the rate and this ratio has seen declined clearly in the pregnancy progresses.

Skin color has an important effect on social and psychological life of human. Skin pigmentation disorders are commonly seen in our country with an incidence of 14.7% in an epidemiologic study (18). Some changes occur in ecrine, apocrine, pilosebaceous and vascular system of skin during pregnancy due to endocrine changes. These changes are thought to occur via hormone receptors on skin and vessels(19). Physiological skin changes occur due to increase in activity of maternal pituitary, thyroid and adrenal glands and hormones secreted from fetoplacental units. hormonal changes observed during pregnancy are not completely known how to influence skin physiology, immunology and inflammatory response, but it is thought that these changes are responsible for physiological skin changes primarily or secondarily(20,21).

Increased pigmentation in pregnancy can be seen in almost every pregnant woman. We see more often in dark-skinned people. MSH (melanocyte-stimulating hormone) and ACTH increase is the result of a general melanosis. The darkening of color mostly seen at nipples, genitals, armpits, moles and scars. Also abdominal midline is typically composed of a dark streak. In our study, during the pregnancy progresses, the percentage increase in pigmentation was observed more frequently.

Progesterone and estrogen has the effect of lowering esophageal sphincter pressure. Cause of reflux seen in pregnancy, especially during pregnancy is because of increasing progesterone levels. As the pregnancy progresses and the increase in intra-abdominal pressure that the complaints with increasing the pressure on the stomach. Most of the complaints start at the first or second trimester pregnant women. In the last three months pregnant, which can be seen in 80% of these problems. Reflux also can cause hoarseness and difficulty in swallowing. In our study, 50% was the higher rate at reflux. Again, the symptoms progressed with gestational age and in the 3rd trimester hoarseness seen with 22.5% ratio and swallowing difficulties has risen to 40%.

In this study, it was shown that symptoms of ear, nose and throat diseases increase as pregnancy progress. Furthermore, incidence of symptoms of tooth and gum diseases, gastroesophageal regurgitation and hyperpigmentation increases in pregnancy. Sudden loss of hearing and facial paralysis were seen very rarely in pregnancy. The incidence of symptoms of ear, nose and throat diseases decreased in postpartum period.

In conclusion, nasal physiological changes take place during pregnancy because of estrogen, progesterone, placental growth factor, neuro peptides, infections and stress. These changes seem to decrease life quality of pregnant women.

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