



Winter-2015 Issue: March, 31st, 2015

Sexual Health • Altered States of Consciousness
Research & Review

SAYIN HÜ

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Human Female: Preliminary Definitions
SexuS Journal 1 (1): 077-088, 2015, MARCH (12 pages)

Altered States of Consciousness Occurring During Expanded Sexual Response (ESR) in the Human Female: Preliminary Definitions

H. Ümit Sayin

Abstract:

Expanded Sexual Response (ESR) is a recently defined phenomenon. It is defined as “being able to attain long lasting and/or prolonged and/or multiple and/or sustained orgasms and/or status orgasmus that lasted longer and more intense than the classical orgasm patterns defined in the literature”. During our detailed preliminary survey to investigate the claimed ESR phenomenon in some particular women, we also investigated the subjective feelings and altered states of consciousness (ASC) during very intense and prolonged orgasms in the women with ESR. During our preliminary survey 72 types of different subjective feelings and ASC patterns were described in the 47 women with ESR. Among these were: depersonalization; out of body experience; flying; dying feeling (petit morte); ecstasy; rapture; explosion feeling; quivering, earthquake feeling; flooding; absorbing; spurting; blessed; shuddering; intense love; unreal; surreal; voyage to nature; seeing light flashes, color flashes, geometric shapes, figures; peacefulness; physical and spiritual warmth; loss of control; spreading; flowing; mystical experience; unification with the partner and/or the universe; de ja vu; crying etc. It is concluded that in some particular women with ESR, some of the very intense and prolonged orgasms induce a form of ASC of which mechanism is not explained yet! Pudental, pelvic, hypogastric and vagus nerves and oxytocin pathway is involved in the development of female orgasm. We hypothesize that blended nerve activation among these four nerves during ESR may be inducing extraordinary subjective feelings and ASC during profound female orgasms. “Four nerve theory of female orgasm” may explain the ASC during ESR to some extent. Also involvement of dopaminergic, serotonergic, noradrenergic, opioid, prolactinergic and oxytocinergic pathways may modulate the altered mood states during ESR induced ASCs. Near to our ongoing research, more research to determine the scientific basis and parameters of ESR phenomenon in some females should be carried out, as well as the research on the neurological, psychological and neurochemical mechanisms of ESR induced ASCs in some females’ psyche.

KEY WORDS: Expanded Sexual Response (ESR); Expanded Orgasm (EO); Altered States of Consciousness (ASC); Status Orgasmus (SO); Four nerve theory of female orgasm

SexuS Journal • 2015 • 1 (1): 077-088

Introduction

Expanded Sexual Response (ESR) (Sayin, 2011 a, b, c) and Expanded Orgasm (EO)

(Rhodes, 1991; Schwartz, 1999; Bodansky, 2000; Taylor, 2000, 2002; Sayin, 2010, 2012) are novel terms to define a prolonged and more intense sexual response in the human female. During the last decades many books have been written about the possibility of the enhancement of female sexual response

Corresponding Author: H. Ümit Sayin, M.D., PhD.

Address: : Institute of Forensic Sciences, Istanbul University, Cerrahpaşa-Aksaray, Istanbul-Turkey

 humitsayin@gmail.com www.drumsayin.com

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(Rhodes, 1991; Schwartz, 1999; Bodansky, 2000; Taylor, 2002; Zdrok, 2004; Sayin, 2010, 2012). A form of ESR, *Status orgasmus*, a prolonged orgasm pattern lasting for 43 seconds in the human female had also been defined by Masters and Johnson, earlier (Masters & Johnson, 1966). Other incidences of prolonged and multiple orgasms in extensive numbers have been documented in the literature, such as 134 to 200 orgasms being attained in one hour in some particular cases (Sayin, 2010). After 1980's a lot of research have been done on the limits and extents of female pleasure and orgasmic states. It has been hypothesized that orgasmic response can be enhanced and expanded in certain ways in some particular females after training sessions (Taylor, 2000, 2002; Rhodes, 1991, Bodansky, 2000; Sayin, 2010, 2012).

ESR has been defined as: *"being able to attain long lasting and/or prolonged and/or multiple and/or sustained orgasms and/or status orgasmus that lasted longer and more intense than the classical orgasm patterns defined in the literature"* (Sayin, 2011 a, c). In the Eastern, Chinese, Indian and Tantric literature similar enhanced orgasmic experiences of females have been reported (Vatsyayana, 1883; Chang 1977, 1983; Schwartz, 1999; Chia 2002, 2005; Mumford, 2005; Michaels 2008).

Recently, some studies of orgasmic women also revealed a form of ASC during orgasms (Komisaruk et al., 2006; Sukel 2011). There are increasing numbers of reports of females experiencing a form of ASC during prolonged and very intense orgasms, which form a novel concept of ESR. However, in those studies no classification of the sexual response was made to address a question such that, whether these women were experiencing an enhanced orgasm pattern and ESR, or not. Most of the questionnaire that investigated the ASC during orgasms was prepared to

quest an average orgasm pattern of a women.

In a recent study, our survey research has pointed out that some women who claim to have ESR (ESR-women) had some main characteristics compared to the women who don't have ESR (None-ESR, NESR-women); ESR-women had at least five or more of the following characteristics of their sexual response (Sayin, 2011 a):

- 1) The ESR women experienced vaginal, clitoral and blended orgasms, as described by Ladas et al., (Ladas, 1982).
- 2) The ESR women experienced multiple orgasms in most of their sexual activities.
- 3) The ESR women were able to attain long lasting and/or prolonged and/or multiple and/or sustained orgasms and/or *status orgasmus* that lasted longer than the classical single orgasm and/or multiple orgasm patterns defined in the literature.
- 4) The ESR women claimed to have stronger pelvic floor muscles (PFM) compared to NESR women.
- 5) The libido of ESR women was very high compared to NESR women.
- 6) ESR women described a phenomenon called G-Spot orgasms.
- 7) ESR women described sensitive erogenous zones in their genitalia other than clitoris.
- 8) ESR women masturbated more frequently compared to NESR women.
- 9) ESR women had erotic fantasies more frequently than the NESR women.
- 10) ESR women admitted to have a form of *altered states of consciousness* during some of their prolonged orgasms and/or *status orgasmus*.

We have investigated the ESR phenomenon further by using specially designed three *preliminary* scales in the females who have claimed to have ESR during our ongoing surveys. The main hypothesis of this article is, *"during enhanced and prolonged orgasms, women may experience different forms of altered states of consciousness (ASC)"*. Further statistical analysis will be carried out when the study is



completed.

Methods

Preliminary SAYIN-ESR-SO scale (expanded sexual response and status orgasmus scale; containing 35 specific questions), *preliminary* SAYIN-ESR-PFM scale (expanded sexual response and pelvic floor muscles; containing 26 questions) and *preliminary* SAYIN-Subjective Orgasmic-ASC Experience Scale (seventy two item scale) have been used. All of these *preliminary* scales were designed to establish a psychometric analysis and a final scale for ESR phenomenon in future and to collect *preliminary data* to determine the definitions of ASC and/or subjective feelings during ESR-orgasms. Former orgasmic scale of Mah & Binik (Mah, 2010) and other reports (Fisher 1973, 1977; Taylor, 2000) were also taken into consideration during the determination of the characteristics of ASC and subjective feelings in the female ESR-orgasms. The seventy two item subjective feeling and ASC *preliminary* scale has been designed after many other surveys and interviews (Sayin, 2003 a, b; Sayin, 2010; Sayin, 2011 b; Sayin, 2012) since 1991 and other correspondence with women.

A total number of 47 women of different nationalities who claimed to have a form of ESR were interviewed through scientific circles, universities, former survey correspondence, internet, web site notices, and Facebook communications (through Facebook chat and/or g-mail chat) between 2010 and 2012 (the study is still continuing). Also data from a control group of NESR-women was collected (not presented in this paper).

Before starting the survey, many interviews with the women and/or literature reviews were made to determine 72 different subjective feelings or ASC pat-

terns experienced in a single, multiple and/or prolonged ESR orgasm. Since this is a descriptive *preliminary* report for the definitions of ASC in ESR-orgasms, not much emphasis is given to statistical analysis, which will be carried out in future studies and publications. All data is entered into SPSS program and frequencies of occurrences were calculated by SPSS.

In SAYIN-Subjective Orgasmic-ASC Experience *preliminary* Scale, 72 subjective feelings and ASC patterns were asked to be filled in a table using a 0-6 likert scale from experienced very frequently (6) to experienced very seldom (1) or to none (0) *during*; a) single clitoral orgasm, b) single vaginal orgasm, c) multiple orgasms, d) ESR; blended, prolonged, sustained orgasm; and/or *status orgasmus*. The definitions of ESR, blended orgasm, multiple orgasms and *status orgasmus* were given with many figures and plots for explanations in the beginning of the scales as:

The Definition of ESR

Being able to attain long lasting and/or prolonged and/or multiple and/or sustained orgasms and/or *status orgasmus* that lasted longer and more intense than the classical orgasm patterns defined in the literature.

Do you or did you have such a sexual response?

A) YES B) NO

Definition of Status Orgasmus

Status orgasmus is the continuous form of blended orgasms and/or clitoral/vaginal orgasms that last for starting from 1 minute to 10-15 minutes (or more). During *status orgasmus* a continuous orgasmic state is experienced and very few women are believed to achieve *status orgasmus* state. *Status orgasmus* can be seen in vaginal and clitoral orgasms, however mostly it is seen as an expanded/extended form of blended orgasms, in which both clitoral and vaginal orgasm reflexes are triggered at the same



time. Similar orgasmic states and full body orgasms are also defined in Tantric literature. The duration may change from woman to woman. *Status orgasmus* was first defined by Masters & Johnson as lasting for 43 seconds in a woman in 1966. Today it is estimated that *status orgasmus* continues for 1 to 2 minutes, while it may last for 10 to 15 minutes, a prolonged and extended orgasmic state which ends by a giant orgasm (Big-O) that gives a big relief and satisfaction at the end. In most of the *status orgasmus* experiences there is usually a refractory period of 10 to 15 minutes. The number of minor orgasms in a *status orgasmus* may exceed from 5-10 to 20-30 (some women claim that this quantity goes up to around 50). In *status orgasmus* it is thought that pudental, pelvic, hypogastric and vagal nerves mediate the triggering mechanism at the same time. In the following graphs the physiological changes and pleasure/satisfaction is depicted. *Status orgasmus* is a continuous form of tetanic orgasms of blended, vaginal or clitoral origin.

According to this information answer the following

Have you ever had status orgasmus?
a)YES b)NO

Other Definitions

Single Female Orgasm: Clitoral or vaginal orgasms. Clitoral orgasm is mediated by pudental nerve; vaginal orgasm is mediated by pelvic nerve. It has long been debated that some vaginal orgasms are triggered by Grafenberg's Spot (G-Spot) (Ladas, Whipple, Perry G-Spot, 1982). Clitoral orgasm is generally perceived in a local genital area, as bursting; 80 to 90 % of women have experienced it. Vaginal orgasms are said to be more satisfactory and more radiating.

Multiple Orgasms: Multiple orgasms can be either clitoral or vaginal or induced by both. There is a successive train of orgasms, generally increasing in amplitude and intensity gradually.

Blended Orgasms: Blended orgasms can be mediated by the orgasm triggering mecha-

nism of both clitoris and spots of vaginal origin (such as G-Spot, A-Spot, O-Spot or Cervix). A blended orgasm is much more intense than a clitoral or vaginal orgasm alone. Both pudental and pelvic nerves mediate the triggering of blended orgasm. Blended orgasms are much more satisfactory and they are multiple orgasms. (Ladas, Whipple, Perry, the G-Spot, 1982; Komisaruk, Beyer-Flores, Whipple, The Science of Orgasm, 2006)

The survey correspondents were also questioned about their medical history and the women who had had some psychiatric background such as bipolar disorder, persistent genital arousal syndrome, hyperthyroid disorder, obsessive compulsive disorder, or sexual compulsive disorder etc. were not taken into the study, since the enhanced sexual response in those women could be related with the psychopathology or metabolic pathology. Also the women were questioned about their psychiatric background and whether they used any drugs of abuse, such as hallucinogens. The women who were diagnosed as alcoholic, psychotic, bipolar disorder, manic disorder, schizophrenic, paranoid disorder, etc. and the women who used any drugs of abuse were not taken into the study.

Further detailed analysis of the results with proper statistics compared with the control group will be published when the study is completed. This article is only a preliminary report to support the hypothesis that enhanced and prolonged orgasms may induce many different forms of ASC in the human female.

Table 1. Subjective perception and ASCs. Experiences during a single clitoral or a single vaginal orgasm are not included and presented. Category explanation for A: 76-100%, B: 50-75 %, C:



25-49% and D 1-24%. During a multiple orgasm and during a prolonged orgasm with ESR (prolonged orgasms, blended orgasms, status orgasmus). Freq. C: frequency category *: very few < 5 %

	Freq. C
1) Depersonalization	A
2) Out of body experience *	D
3) Dissolve, feeling dissolved in something	C
4) Fly, flying experience, sensation of flight	A
5) Astral voyage feeling *	D
6) Death feeling (petit morte)	C
7) Near death experience feeling *	D
8) Absorbed feeling	C
9) Elated feeling, heightening feeling	A
10) Elevation of mood feeling	A
11) Flooding feeling	B
12) Immersing feeling	C
13) Pulsating feeling, pulsating with the rhythm of heart feeling	A
14) Spurting feeling	B
15) Volcano, feeling as an eruption of a volcano	D
16) Uncontrolled feeling, losing control feeling	A
17) Blissful, blessed feeling	A
18) Flowing sensation	B
19) Quivering, trembling	A
20) Shuddering	A
21) Earth quake feeling *	D
22) Intense Love	A

Table 2. Subjective perception and ASCs. Experiences during a single clitoral or a single vaginal orgasm are not included and presented. Category explanation for A: 76-100%, B: 50-75 %, C: 25-49% and D 1-24%. During a multiple orgasm and during a prolonged orgasm with ESR (prolonged orgasms, blended orgasms, status orgasmus). Freq C: frequency category *: very few < 5 %

	Freq. C
23) Swelling feeling	C
24) Intense euphoric feeling, intense euphoria	A
25) Flushing feeling	A
26) Rapturous feeling, being in a rapturous state	A
27) Unreal, feeling of being beyond this reality	B
28) Surreal, feeling of surrealism	C
29) Opening into a surreal universe feeling *	D
30) Opening into a cartoon world, seeing cartoon characters *	D
31) Close to herself, to the environment feeling	B
32) Close to the partner feeling	A
33) Exciting, getting excited feeling	A
34) Extreme excitement coming from inside, not to know what to do	A
35) Totally filled feeling	A
36) Fulfilling, fulfillment feeling	B
37) Peaceful, a peaceful state of mind	A

38) Relaxing, feeling of relaxed	A
39) Peacefully relaxing and extremely soothing feeling	A
40) Throbbing feeling, throbbing as heart rate	A
41) Warm feeling	A
42) Physical warmth feeling	A
43) Spiritual warmth feeling	A
44) Feeling of losing oneself totally	A

Table 3. Subjective perception and ASCs. Experiences during a single clitoral or a single vaginal orgasm are not included and presented. Category explanation for A: 76-100%, B: 50-75 %, C: 25-49% and D 1-24%. During a multiple orgasm and during a prolonged orgasm with ESR (prolonged orgasms, blended orgasms, status orgasmus). Freq C: frequency category *: very few < 5 %

	Freq. C
45) Ecstatic feeling, being in ecstasy	A
46) Exploding, explosion feeling	A
47) Hot, feeling hot	A
48) Tickling	B
49) Pleasurable, extreme pleasure feeling	A
50) Feeling of rising, going up	A
51) Spreading feeling	B
52) Wild, feeling that oneself becomes wild, primitive	C
53) Feeling as an animal	C
54) Losing the soul feeling	B
55) Soul outside, leaving the body feeling	B
56) Feeling of dissolving into the partner	A
57) Feeling of flaring of lights, seeing different colors of light flashes (just once or twice and very shortly)	B
58) Seeing different known colors (plus unknown colors or not)	D
59) Mystical experience *	D
60) Seeing white or colored flashes continuously	B
61) Seeing different geometrical objects, shapes	D
62) Feeling the body and mind extraordinary	A
63) Travelling to different lands, e.g. evergreens, forests, waterfalls, gardens etc. *	D

Table 4. Subjective perception and ASCs. Experiences during a single clitoral or a single vaginal orgasm are not included and presented. Category explanation for A: 76-100%, B: 50-75 %, C: 25-49% and D 1-24%. During a multiple orgasm and during a prolonged orgasm with ESR (prolonged orgasms, blended orgasms, status orgasmus). Freq C: frequency category *: very few < 5 %

	Freq. C
64) Finding one's self in different lands, e.g. evergreens, forests, waterfalls, gardens etc. all of a sudden *	D
65) Losing oneself	A
66) Unify, a unification feeling with anything	B
67) Unifying with the partner	A
68) Extreme feelings of love and bursts of love to the partner	A



69) Unifying with environment and universe	D
70) De ja vu *	D
71) Strong attachment feeling to the partner	B
72) Cry, irresistible wish to cry	A

Results

The results from SAYIN-Subjective Or-gasmic-ASC Experience *preliminary* Scale are given and discussed in this article. The results are given in the following tables as the occurrence frequencies are pointed out as A, B, C and D which depict the following frequencies of the ASC and/or subjective feeling to be seen and recorded in the female subjects during a multiple orgasm and/or an ESR induced orgasm:

A) Recorded in between 76-100 % of the subjects B) Recorded in between 50 to 75 % of the subjects C) Recorded in, between 25 to 49 % of the subjects D) Recorded in between 1 to 24 % of the subjects.

Our preliminary comparison of these results showed that some NESR control women also experienced ASC during clitoral or multiple orgasms; however the variety and frequency of their experience of ASC was significantly much lower compared to the ESR women. The detailed statistics of the data will be published when the study is completed.

Discussion

Some of the psychological changes during female “*intense orgasms*” had been well documented by Fisher such as *depersonalization, flying, rapture* and *ecstasy* etc., however Fisher observed such ASC’s in a group of women he called “*high orgasmic*”, who could have been named as women with ESR if interviewed today (Fisher, 1977). Similar psychological

changes of female mood during intense orgasms have been cited in the literature during the last decades (Swartz, 1994; Taylor, 2000; Sayin, 2010, 2012; King, 2010; Sukel, 2011). In French language, one of the terms used for female orgasm is “*petit morte*” (little death), trying to articulate the flying, out of body, dying, dispersion of consciousness experiences during an intense orgasm.

During our surveys in 1993, 2003, 2010-2012, we have interviewed with similar ASC cases of “*high orgasmic*” women (Sayin, 2010; Sayin, 2011 a, b, c; Sayin, 2012; Kocatürk, 2011). We are not presenting the comparison of the ASC frequencies, averages of likert scaling, and statistics between ESR and NESR women in this article, since this is a *preliminary* report of some of the definitions and this study is still continuing.

It was Mah & Binik’s study first opened a typical discussion on such altered mood states during female orgasms (Mah, 2001, 2002, 2005, 2010; King, 2010). King, Mah & Binik categorized subjective feelings of female orgasms into 10 dimensions as building sensations, flooding sensations, flushing sensations, shooting sensations, throbbing sensations, general spasms, pleasurable satisfaction, relaxation, emotional intimacy, and ecstasy (King 2010). However, in Mah & Binik’s studies there was no classification of women in terms of the properties of orgasmic response, such as clitoral, vaginal, blended and/or ESR.

It is problematic if the quality and details of orgasmic response (whether it is *clitoral, vaginal, multiple* or *enhanced/prolonged orgasm*) is not recorded and reported; and if ASCs during an enhanced orgasm is mixed with a traditionally accepted form of orgasm; because it is *not* easy to decide then, whether this form of ASC is a result of a very powerful



and prolonged orgasm or not! For instance, in our groups *mystical experience* was never recorded in NESR women, but some women with ESR reported to have a form of *mystical experience*. Also, the average scoring of “*flying*” (4) was below 2 in likert scale in NESR women during *multiple orgasms*; however it was above 4 during ESR women’s *multiple orgasm experience*. Near to this, NESR women did not experience *prolonged and ESR orgasms* that lasted very long and intense, so there was no control group data to compare ESR women’s *prolonged orgasm experience* with anyone in the whole study group!

In our group, we have used a similar scale including King’s orgasmic dimensions, although we have not classified the feelings in certain categories yet, we have found similar patterns in female orgasmic response as King, Mah & Binik did. We have not divided the subjective feelings and sensations into ASC and non-ASC subjective feelings, because it is not for sure at what point a subjective feelings turns into ASC or can be accepted as ASC, further analysis in our series will be carried out. Among King’s classifications some of the reported feelings were obviously a form of ASC, such as flooding, spreading, shuddering, soothing, unifying, ecstatic, rapturous etc.

Taylor also described similar alterations of the mood in her PhD thesis (Taylor, 2000). In Taylor’s study, the expanded orgasm (EO) or ESR duration was 0.2 to 60 minutes and even more in some particular cases in 22 female subjects (a total of 44 subjects or 22 couples). Taylor had classified her cases into four dimensions as *physical, mental, emotional* and *spiritual*. Taylor’s cases described a deep experience of ASC such as, more pleasure; deep relaxation; heightened sensations; increased energy; temporary pain relief; energy expanding out of body;

deep relaxing abdominal breathing; increased clarity and creativity; acceptance of the self and others; extra sensory perception; ecstasy; mystical experience; divine feelings; increased awareness of the body; mind connection and integration; psycho-spiritual birth and death experience; loss of illusion of spatial separation; loss of spatial dimensions, loss of sense of time; personal boundaries dissolving and merging with the divine; cosmic emptiness and void; sharing with the partner; compassion; sense of fulfillment etc. (Taylor, 2000).

Our final psychometric scales for assessing the mood changes and ASC during ESR may contain more than 72 items; however this is a *preliminary* report of a *preliminary study* that concludes that enhanced and expanded female orgasmic response (EO) may alter the consciousness and induce many extraordinary mood states which is not defined in the literature clearly yet. We have also classified these alterations in clitoral, vaginal, multiple and ESR-prolonged orgasms. Our data (not shown) also suggests that there can be an alteration of consciousness and ASC in some single clitoral or vaginal orgasms alone, without any ESR; however, it is more likely to experience many of those proposed 72 subjective feelings and ASCs during ESR orgasms. Our data supports Fisher’s, Taylor’s and King, Mah & Binik’s findings (Fisher, 1977; Taylor, 2000; Mah, 2001, 2002, 2005, 2010, King 2010).

The neurological, psychological and neurochemical mechanisms of emerging of ASC during an EO and an ESR are not investigated and explained thoroughly yet. The main mechanisms of ASC can be correlated with the abruptly released neurotransmitters in certain parts of the brain and the activation and/or deactivation of different parts of



the brain.

It is reported that during a single orgasm developing by masturbation or by intercourse, *dopamine* (Stahl, 2001; Brown, 2007; Passie, 2005; Kruger, 2002, 2005, 2006), *prolactin* (Passie, 2005; Kruger, 2002, 2005, 2006), *oxytocin* (Stahl, 2001; Argiolas, 2003; Passie, 2005; Krüger, 2002, 2005, 2006), *melanocortin* (Brown, 2007), *serotonin* (Stahl, 2001; Brown, 2007) *norepinephrine* (Stahl, 2001) and *endogenous opioid peptides* (Argiolas, 2003) are released and involved in the mechanisms of orgasmic and post orgasmic mind states. Acute dopamine release is a pleasure inducing factor during the female orgasm (Stahl, 2001; Brown, 2007, Kruger 2002, 2005, 2006). It is also reported that the ASC inducing hallucinogen MDMA (ecstasy) mimicked a post orgasmic state of mind which is induced by the release of prolactin (Passie, 2005). It is well documented in the literature that dopamine, serotonin, norepinephrine, endogenous opioid peptides induce changes in the mood and consciousness. The extraordinary subjective feelings during female orgasm cited in this paper (or more of them which are not investigated yet) can be caused by the abrupt *robust* changes in the neurotransmitter concentrations at the synaptic clefts at certain parts of the brain, mainly in the sensory cortex and limbic system. Namely, the powerful and longer the orgasmic state, the considerable and substantial, these alterations and ASCs will be. Subjective feelings and ASC recorded in our study group mimic the acute effects of some hallucinogenic drugs studied in the literature. Our ongoing survey and orgasmic ASC study will be revealing more data and insights about a possible future research on the subjective consciousness alterations during a classical or ESR female orgasm. It was obvious that in ESR, those cited ASCs

were more frequently experienced compared to a single clitoral or vaginal orgasm.

The ASCs in ESR may also be related with the activation and deactivation of certain areas of the brain. Komisaruk's team, who have been doing fMRI studies during female orgasm, recently found heightened activation in the prefrontal cortex (PFC) during female climax - something not seen in the previous studies of female orgasm (Komisaruk, 2004, 2005, 2011). Surprisingly, this was also the case in the individuals who can achieve orgasm by thought alone, a recently defined case of '*brain orgasms*'. With fantasy and self-referential imagery often reported as being part of the sexual experience, Komisaruk et al. investigated if the PFC might be playing a key role in creating a physiological response from imagination alone. According to Komisaruk, female orgasm is also a different form of consciousness (Sukel, 2011).

Georgiadis et al., performed similar experiments in which they found that some brain regions "*switched off*" during orgasm. Specifically, they saw significant deactivation in an area of the PFC called the left orbitofrontal cortex (OFC) (Sukel, 2011). Georgiadis found that during sexual stimulation and arousal, left (L) inferior parietal lobule and L postcentral gyrus were activated in both men and women; however right (R) amygdala, R and L fusiform gyrus, R middle temporal gyrus, L inferior temporal gyrus were deactivated. During orgasm, L cerebellar vermis of anterior lobe were activated in both men and women, while R gyrus rectus, L inferior frontal gyrus, L middle frontal gyrus, L superior frontal gyrus, L medial frontal gyrus, L inferior frontal gyrus L middle frontal gyrus were deactivated in both sexes. In females R insula was more activated than males during orgasm (Georgi-



adis, 2009). Georgiadis also reported that regional cerebral blood flow (rCBF) increased in the left secondary and right somatosensory cortex during arousal by means of clitoral stimulation. During clitoral orgasms however rCBF was decreased in the neo cortex, particularly in the left lateral orbitofrontal cortex, inferior temporal gyrus and anterior temporal lobe. Georgiadis found that orgasm related increases of rCBF occurred in the deep cerebellar nuclei, right caudate nucleus (Georgiadis, 2006). No fMRI or other studies on the correlation of orgasm related mood changes and brain activation/deactivation have been reported yet.

Komisaruk et al., reported that clitoral, vaginal and cervical stimulation differentially activated the regions of the sensory cortex (Komisaruk, 2011). Komisaruk & Whipple also reported some orgasms of none-genital origin, coining the term “*brain orgasms*”, where there was no genital stimulation, orgasm might occur in some women (Komisaruk, 1998). Vagal nerve involvement in the development of female orgasms was also reported, defining that vagus nerve innervating uterus and cervix, supplying a by-pass pathway distant from the plexuses related with spinal cord (Komisaruk, 2003, 2004). Komisaruk and Whipple reported that during a female orgasm induced by vaginal-cervical stimulation, hypothalamic paraventricular nucleus (where oxytocinergic neurons originate), amygdala, hippocampus, pre-optic area, basal ganglia, cerebellum, anterior cingulate, lower brain stem and insular-parietal-frontal cortices were activated in the female brain (Komisaruk, 2005). It is hypothesized that pudental, pelvic, hypogastric and vagus nerves are involved in the development of female orgasm (Komisaruk, 1998, 2003, 2004, 2005, 2006, 2011).

Most probably, primarily *dopaminergic* pathways may be involved in the alterations of mood as the studies cited above point out. Also acute releases of oxytocin and prolactin may be responsible of some of the mood changes and ASC patterns during prolonged orgasms.

Four Nerve-Six Pathway Theory of Female Orgasm

In most of the studies of fMRI, MR and PET, investigating female orgasms, single stimulus from only one locus is studied, as it is mostly the clitoris. However, today we know that female orgasm develops through different pathways and the stimulations of different loci (Komisaruk, 2006) (Figure 1). For the explanation of prolonged, enhanced and expanded orgasms, “*the blended orgasm theory*” seems to be the most plausible one (Ladas, 1982). It is also reported that female orgasms can develop through the stimulation of nipples and hence through intercostal nerves-(T2-T5 vertebrae, particularly T4)-hypothalamus-pituitary-oxytocin pathway (Komisaruk, 2006; Magon, 2011).

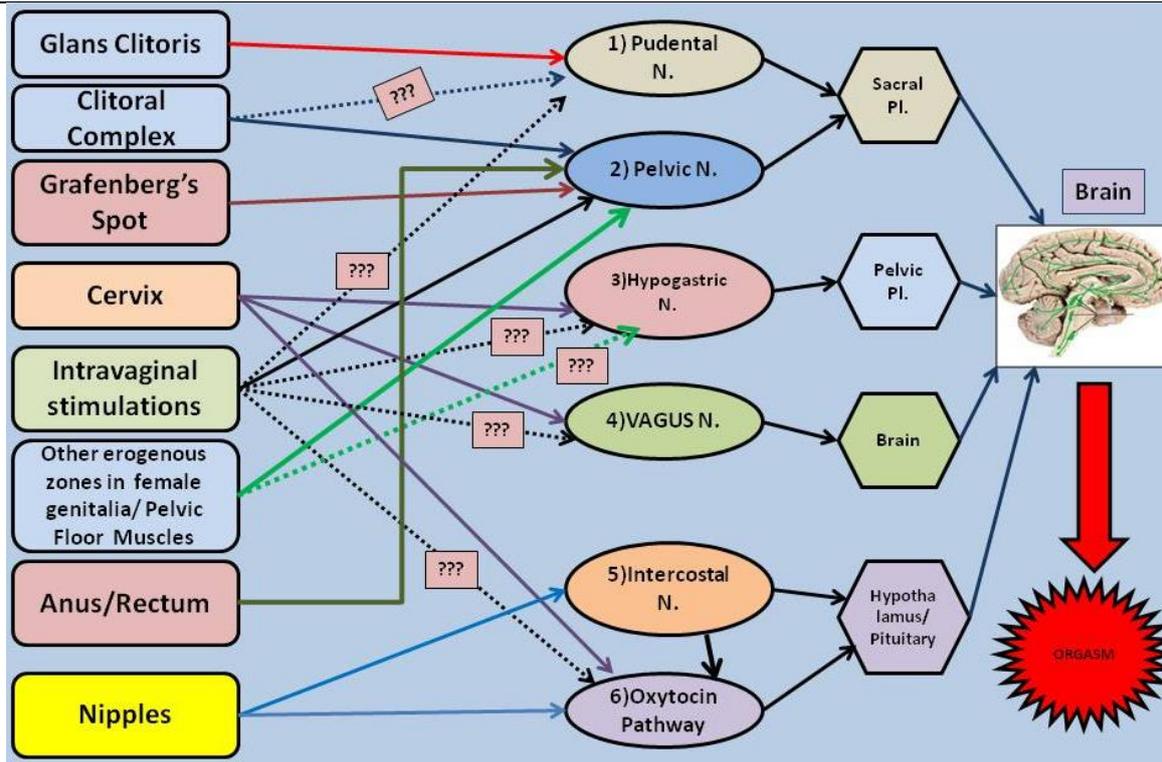


Figure 1. Four nerve and six pathway theory of female orgasm.

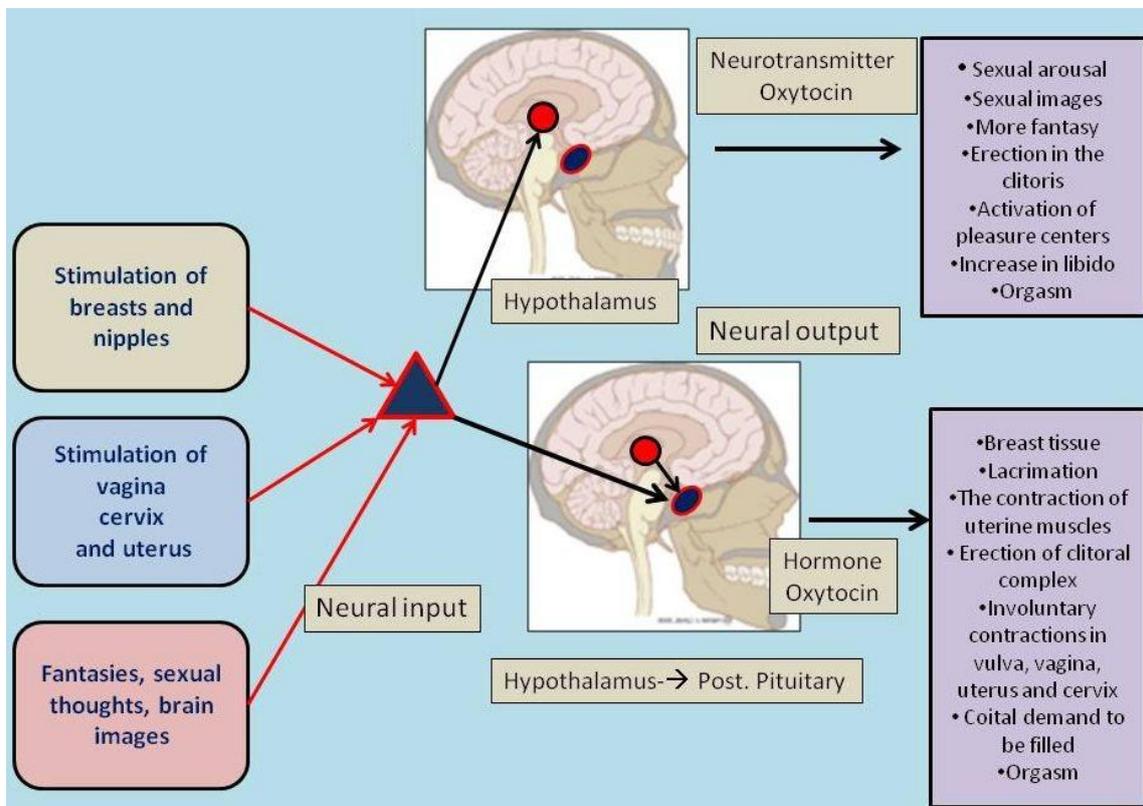


Figure 2. Oxytocin pathways.



Oxytocin has an effect as a neurotransmitter in the brain and it is also released from the pituitary to the bloodstream (Argiolas, 2003). Thus forming a double fold pathway system (Figure 2).

Besides pudental, pelvic, hypogastric and vagus nerve pathways, the two oxytocin pathways may also contribute to the development of female orgasms, forming a four nerve-six pathway module for the explanation of enhanced female orgasmic response.

We hypothesize that during ESR orgasms, multiple pathways and cerebral centers contribute to development of *prolonged* female orgasms. When multiple pathways are involved, a lot of different cerebral loci and immense changes in many neurotransmitter systems may take part in the development of female orgasms acutely, thus inducing an extraordinary mood and consciousness change.

ESR induced orgasms have been defined recently in the medical literature (Taylor, 2000; King, 2010; Sayin, 2011, 2012). More emphasis should be given to an extended and further research on ESR and ESR induced prolonged female orgasms to understand the neuroanatomical, neurochemical and psychological mechanisms of ESR to unveil female orgasmic response.

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