

Exploring The Role Of Demographics And Emotional Processing In Pseudobulbar Affect

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ABSTRACT

The subject of this research was to look at the role of demographics (gender and age) and emotional processing (EP) in pseudobulbar affect (PBA). This study involved data collection and analysis from 150 individuals of age 18 and above with pseudobulbar affect from hospitals of Azad Jammu and Kashmir (AJK) and Khyber Pakhtunkhwa (KP) (98 females, 52 men). SPSS version 26 was used to analyze the outcome after data collection, and collected data were analyzed utilizing linear regression analysis and the test. Applied survey instruments were the emotional processing scale (EPS) and the center for neurologic study lability scale (CNS-LS). Based on our findings, statistically significant gender variations in emotional processing were identified as males have more problematic emotional processing than females. However, there have been no significant gender differences in pseudobulbar affect. Age was a significant predictor for emotional processing, as age is a major predictor, while age was not a significant predictor for pseudobulbar affect. This study also found that emotional processing is a significant predictors of pseudobulbar affect. Implications of the study include the role of gender and age in pseudobulbar affect and the role of emotional processing in pseudobulbar affect as well. Further implications and limitations of the study were also discussed.

Keywords: Emotional processing, Predictor, Differences, Pseudobulbar Affect.

INTRODUCTION

A pseudobulbar affect (PBA) condition is associated with brain injury or neurological disease that manifests inappropriate and uncontrolled crying and laughter outbursts. PBA results in patients' isolation, reduced social functioning, and embarrassment and burden for caregivers. PBA symptoms occur in many neurologic brain diseases, such as abrupt, incongruent crying and laughing episodes. These are independent of mood. Symptoms are thought to result from damage to neural pathways associated with the processing of

emotions and motor functioning (Cummings & Andersen, 2013).

PBA has been labeled as different terms like emotionalism, laughing and crying, conflicting emotions, and disorder of involuntary emotional expressions, but the final term the "pseudobulbar," originated from the idea that this term (PBA) resembled those of lesion of brain regions (Cummings et al., 2016). Less frequently used terms for PBA are violent crying, involuntary types of crying, or pathologic emotionalism (Dark, McGrath, & Ron, 1996). PBA is encountered in many other diseases but in rare cases, including syphilitic

PBA palsy, Wilson's disease, gelastic epilepsy, and lipid storage disease (Schiffer & Pope, 2005).

PBA activation goes through neurotransmitters, including glutamate and excessive secretion, leading to abnormal neural transmission (Altevogt & Pankevich, 2011). PBA is associated with a disturbance of emotions and an abnormality of facial expressions. Even though in treatment and diagnosis of PBA, some professionals hesitate because they think the disorder is out of their specialty and not in the classification of disorders in the Diagnostic and Statistical Manual of Mental Disorders. PBA is an underdiagnosed disorder because patients do not report symptoms. Among healthcare and communities, there is a lack of general awareness about pseudobulbar affect to diagnose it as a distinct disorder. Even when PBA symptoms are recognized, they are mistreated as a sign of depression and other conditions (Cummings & Andersen 2013).

Neurologic patients exhibit PBA symptoms because of loss of cognition abilities and abnormal processing of emotions (Parvizi et al., 2009). Damage to cerebral inputs from demodulation of emotional processing is a characteristic of PBA (Floeter et al., 2014). The condition that is out of proportion and unable to be suppressed by the patient, rather than laughing, tearfulness, or crying, is more prevalent in PBA. Generally, crying behavior is associated with emotional situations, like the death of someone or listening to a sad story. Still, episodes of PBA occur in situations that are not considered by others to be sad or funny (Strowd et al., 2010).

According to some studies, PBA is more prevalent in women (crying) (Thakore & Pioro 2017), while other studies describe its prevalence in males (but only laughter) (Fitzgerald et al., 2018). Men may easily avoid crying because of social embarrassment and fear of societal expectations. The exact age-based prevalence of PBA in adults and older is

unclear because of the limited literature studies. No study cleared this prevalence in neurologic disorders (Demler, 2017).

Faster emotional processing is considered best, but in modern society, it is considered a sign of abnormality, more often seen in females than in males (Knyazev, Slobodskoj-Plusnin & Bocharov 2010). Emotional problem-solving capacity increases with age positivity (Carstensen et al., 2011). Older adults have difficulty recognizing some feelings of happiness, anger, or sadness (Ruffman et al., 2008). Emotional recognition decreases with aging (McCade & Naismith, 2011).

In this entire context, the present study would be a greater contribution to understanding the role of demographics and emotional processing in pseudobulbar affect because very few researches have been found in this area to know about PBA prevalence. Therefore, the study objective was to assess the characteristics of the demographics (gender and age) on emotional processing and pseudobulbar affect among adults. The remainder of the manuscript has been structured. The next section is about the literature review; section three describes the methodology, and section four describes all the study results and discussion. The last section concludes all the results and important policy implications of the study.

LITERATURE REVIEW

Theories of Pseudobulbar affect

- Gate control theory: pseudobulbar affect results from emotional disturbance, as brain areas involved in emotional processing become damaged. So, it caused pathological crying and laughter
- Release hypothesis: neurological disorders damage frontal lobe neurons. These neurons lost their ability to control laughter and cry. This neural

damage affects brain areas that cause extreme laughter and crying.

- Theory of dysfunctional neurotransmitters: dopamine, glutamate, and serotonin are neurotransmitters that lose their ability to transfer messages it resulting in emotional disturbance (Crumpacker, 2016).

Role of Emotional Processing in Pseudobulbar Affect

Pseudobulbar affect is an involuntary expression of emotions of laughing or crying without joy, happiness, anger, or sadness. They have trouble controlling their emotions and respond intensely to sad and funny situations (Brooks et al., 2004). Their family members, friends, and the patient themselves may face episodes of anger and frustration because they feel embarrassed about their behavior (Holland, 2004).

A research study found the emotional influence on cognitions to identify its effects on mental level and behavior. It was indicated that high emotional abilities improve our cognitive abilities. (Cabello, & Fernandez-Berrocal 2017). Emotions have significant contributions to cognitions; emotions have a greater contribution in our life to making decisions (Phelps, 2006). Attention, perception, and memory are cognitive processes correlated with emotions. They collectively contribute to achieving environmental adaptation (Pessoa, 2008).

A study in the USA estimated that 3.6% to 42.5% of the population with the neurological disease has pseudobulbar affect symptoms. Patients facing neurological disease have symptoms of involuntary emotional expression disorder (Pseudobulbar affect). Neurological illness changes the emotional processing of such patients, so it does not remain normal (Hakimi & Maurer, 2019).

Smith and Grill (2007) defined the pseudobulbar effect as conditions with neurological effects, with different treatment conditions, diagnoses, and care for such patients suffering from the pseudobulbar effect. Pseudobulbar affect relates to brain injury and neurologic diseases of the brain. It also relates to emotional disturbance or involuntary emotional processing (Arciniegas, 2005). The independence of pseudobulbar affect from stereotype behavior, mood, and episodes differentiates it from other disorders like depression (Petracca et al., 2009).

Varjassyova et al. (2013) showed that socialization includes the recognition of famous faces and emotional expressions. The decline in these skills causes communication complexes between caregivers and social factors. A large US study measured the number of problems caused by the pseudobulbar effect in the selected sample due to neurological disease. It was found that the prevalence of pseudobulbar affect is 36.7% in a sample taken from clinics that had evidence of neurological diseases (Brooks, Crumpacker, Fellus, Kantor, & Kaye 2013).

Harris online survey was conducted in the US. The survey was conducted on patients with neurological diseases. A survey revealed that pseudobulbar affect prevailed in about 37.5% of participants. Finally, it was estimated that 1.8-7.1 million US people were affected due to pseudobulbar affect, representing a large patient population (Work, Colamonic, Bradley & Kaye 2011).

Demographic Characteristics of Emotional Processing

It has been identified that rather than decline, emotional processing increase with age. The frequency of positive feelings and the emotional problem-solving process has increased with age (Carstensen et al., 2011). The older struggle to recognize basic emotions such as happiness, surprise, fear, disgust, and sadness (Ruffman et al., 2008). Compared to

younger older adults perform worse in recognizing fear, sadness, and anger, but there are no consistent difficulties with surprise, disgust, and happiness (Isaacowitz et al., 2007). But some studies described a decrease in recognition of negative emotions compared to positive ones (Calder et al., 2003).

Researchers found emotional improvement with aging compared to cognitive functioning (Scheibe & Carstensen 2010). McCade, Savage, and Naismith (2011) studied emotional recognition decline with age. Recognition of emotions improves from childhood to adolescence and adulthood, but it declines late. Aging is related to the increased number of problem-solving strategies and positive emotions. The ability to recognize others' emotions also decreases with age (Carstensen et al., 2011). Fast emotional processing is considered more beneficial but is associated with problematic behavior in modern society, observed in men more frequently than in women. Emotional adjustment is associated with the family's monthly income, the family, the position of the family in society, the neighborhood, and occupational and educational status. (Tsenkova et al., 2007). High-income levels increase happiness, well-being, and emotional regulation. In comparison, an individual ability to manage negative life situations is associated with a lack of resources. This, in turn, increases the chances of negative emotions and negative cognition, which directly affect daily lives and the ability to regulate emotions (Singh & Shankar, 2013).

Demographic Characteristics of Pseudobulbar affect

It is unclear to explain the percentage of neurological conditions in younger and older according to age. Prevalence by age is unclear (Brooks, Crumpacker, Fellus, Kantor, & Kaye, 2013; Demler, 2017). Dysfunctional nerves in children are due to pseudobulbar palsy that

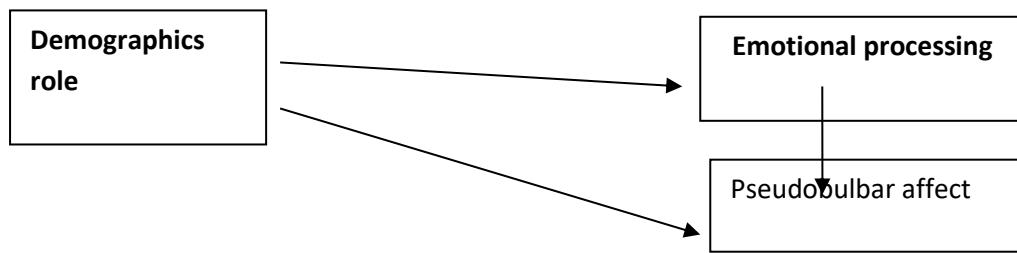
affects speech and causes mental retardation. Pseudobulbar palsy occurs in patients with amyotrophic lateral sclerosis disease (Gerald & Fenichel, 2009).

The pseudobulbar effect is a condition that is unable to suppress and is out of proportion to the patient mood. Rather than laughter, tearfulness is a more common condition in pseudobulbar affect (Ahmed & Simmons, 2013). Women with neurological conditions (conditions that affect brain areas that control emotions and changes in brain chemicals) are more likely to cry in the pseudobulbar effect than laughter. Still, males may suppress these emotions (Thakore & Piro, 2017).

Crying episodes have greater adverse effects on daily living. Men were more likely to be predominant in laughter, whereas women were more predominant in crying. Pseudobulbar affect is more likely to affect the lives of individuals. People with multiple sclerosis have greater chances of pseudobulbar effect. Women were more in this affected group than men, but men were found in laughter episodes (Fitzgerald et al., 2018).

Previous studies found that crying emotional lability is more frequent in women after brain lesions. Cross-cultural studies also identified that normally women cry more than men (van Hemert, Vijver, & Vingerhoets 2011). Their causes may be biological, cultural, or social are unknown. It may be possible that pseudobulbar affect may affect gender differences as women cry more, or maybe men avoid crying because of social embarrassment (Thakore & Piro, 2017). Pseudobulbar affect episodes may vary based on the lesion and gender. Pathological crying with left-sided lesions is more in women than in men. While pathological crying may be more prevalent in men and those with right-sided lesions (King & Reiss, 2013).

Conceptual Framework of the Study



METHODOLOGY

This correlation survey research study was conducted in the Department of Psychology at Hazara University, Mansehra, Pakistan, from April 23rd to December 30th, 2019. Data was collected from Government Mental and General Hospital DadarMansehra, King Abdullah Teaching Hospital Mansehra, Neuro Psychiatrist Irfan Hospital Mansehra, Ayub Teaching Hospital Abbottabad, and Sheikh Khalifa bin Zayed Hospital (CMH) Rawalakot. Purposive sampling included male and female adults, ages 18 and above, educated samples, and indoor neurologic patients in the study. Below eighteen, outdoor neurologic patients and non-educated individuals were excluded from the study.

Emotional processing and pseudobulbar affect scales were used for data collection. EPS was developed by Baker et al. (2010) for assessing impaired emotional processing, while CNS-LS was developed by Moore et al. (1997) to determine the severity of

symptoms of PBA. Data collection permission was given by the ethical committee of Hazara University, Mansehra. An informed consent form was taken from participants and made them aware of the purpose of the study. Respondents were asked to read each question carefully and mark a suitable response that reflected their mental condition. Their responses were recorded through questionnaires, and their identities were kept confidential.

Data Analysis: The linear regression and t-test analysis were done using the Statistical Package for Social Sciences version (SPSS-26).

RESULTS

A sample of 150 individuals was taken, and data was collected from various hospitals In Khyber Pakhtunkhwa, Azad Jammu, and Kashmir. The study identified the role of demographics and emotional processing in pseudobulbar affect.

Table 1 Mean, Standard Deviation, and t-values of Scores of Gender on (EPS) and (CNS

Male (n=52)		Female (n=98)		t(148)	p	95% CI		Cohen's d
M	SD	M	SD			LL	UL	

Emotional processing scale (EPS)	7.3	.89	6.8	1.1	3.1	.00	.18	.84	0.5
Center for neurologic study lability scale (CNS-LS) for PBA	24.7	4.9	25.6	5.2	-1.0	.30	-2.6	.81	0.2

LS; N= 150)

Statistically, significant gender differences were found on EPS, and non-significant gender differences were found on CNSLS (pseudobulbar). It was also found that as

compared to females (M = 6.8, SD = 1.1) problematic emotional processing is more in males (M = 7.3, SD = .89).

Table 2 Linear Regression Analysis Revealing (age) as Predictor of Emotional Processing

Predictor	R	R ²	B	B	F	SE
Age	.05	.05	.03	.25**	10.1**	.00

Age is a significant predictor of emotional processing (EP), [$\beta = .25$, $t = 3.18$, $p = .002$]. Age revealed 5% variations, [$\Delta R = .05$, $\Delta F (1,48) = 10.1$] in emotional processing.

Table 3 Linear Regression Analysis Revealing (age) as Predictor of Pseudobulbar Affect

Predictor	R	R ²	B	B	F	SE
Age	.01	.01	.06	.11	1.9	.04

Age appeared to be a non-significant predictor of pseudobulbar affect (PBA) as [$\beta = .112$, $t = 1.37$, $p = .17$] and 1% variations was revealed in pseudobulbar affect (PBA) [$\Delta R = .01$, $\Delta F (1,48) = 1.9$].

Table 4 Linear Regression Analysis for the role of Emotional Processing in Pseudobulbar Affect

Predictor	R	R ²	B	B	F	SE
Emotional Processing	.27	.27	..09	.52***	56.84***	.013

Emotional processing significantly predict pseudobulbar affect (PBA) as [$\beta = .527$, $t = 7.53$, $p = .000$]. 27% variations are revealed by

emotional processing in pseudobulbar affect (PBA) [$\Delta R = .27$, $\Delta F (1, 48) = 56.8$].

DISCUSSION

This study assessed gender differences in emotional processing and pseudobulbar affect, whereas age was a predictor for emotional processing (EP) and pseudobulbar affect (PBA). The study also examined the role of emotional processing in pseudobulbar affect. There were limited studies in this area to know about the prevalence of PBA according to age and to examine gender differences in emotional processing and pseudobulbar affect. Therefore, EPS developed by Baker et al. (2010) and CNS-LS developed by Moore et al. (1997) were used as survey instruments (N=150). The data analysis revealed significant differences in gender on EPS.

Males had more problematic emotional processing than females (in table I). According to a study, comparing patients and healthy subjects checked hormonal and genetic effects on emotional processing. Then in the results, it was found that in Parkinson's disease, problematic EP is more in males than in female patients. This impairment of emotions especially affects males' genetic contribution and hormones in the recognition of emotions (Heller et al., 2018). Compared to females, males have more facial emotional processing impairment due to cognitive impairment's effects. These results were found by studying normal subjects and others with cognitive impairment (Teng, Lu & Cummings, 2007).

Non-significant gender differences were found on PBA (above table I). Similar results were found in a study by finding the average duration (8.88 in men while 8.87 in women) of PBA in both males and females. Therefore, it was found in the results that there were no significant differences in gender in PBA (Gallagher, 1989). Non-significant differences in gender were found by studying the sample of PBA patients with multiple sclerosis (Feinstei, Feinstein, Gray & O'Connor, 1997).

The present study found age as a significant predictor of EP (table II). Studies in

the literature define emotional functioning and emotional processing changes with age. In contrast to cognition, emotional processing increases rather than declines with age (Mather & Carstensen, 2003). With aging, the emotional problem-solving process and the frequency of positive feelings increase (Carstensen, 2011). Older individuals have poor performance in recognition of facial emotions like anger, sadness, surprise, and fear (Isaacowitz et al., 2007). Recognition of negative emotions decreases with aging compared to recognition of positive emotions (Calder, Keane & Manly, 2003). Recognition of negative emotions decreases with aging compared to recognition of positive emotions (McCade & Naismith, 2011).

Results found that age is a non-significant predictor of PBA (table III). The association between PBA prevalence and age is unclear (Brooks et al., 2013). According to age, the percentage of neurological disorders is a difficult task to fulfill. Age does not significantly predict PBA. Neurologic conditions are free from age criteria for their prevalence (Demler, 2013). Age is a non-significant predictor of PBA in traumatic brain injury. Age has non-significant effects on PBA (Tateno, Jorge & Robinson, 2003).

Emotional processing has a significant positive role in pseudobulbar affect (Table IV). Literature in this regard is as follows. Pseudobulbar affect is an involuntary expression of emotions of laughing or crying without joy, happiness, anger, or sadness. Individuals are having pseudobulbar respond to a sad or funny movie more intensely, sometimes in negative ways. Their emotional states are out of control (Brooks et al., 2004).

Smith and Grill (2010) defined pseudobulbar affect as conditions of neurological diseases. Many patients suffer from the problem of emotional expression appropriately. Pseudobulbar affect is related to brain injury and neurologic brain disease. It

also relates to the disturbance of emotional processing or involuntary processing of emotions. A comparison was made between normal persons and patients with pseudobulbar affect. Results were found that pseudobulbar affect symptoms have a greater impact on aspects of life and emotional processing (Cummings & Andersen, 2013). Schwarzbald et al. (2013) described pseudobulbar affect as a disorder of human emotions. Pseudobulbar affects motor neuron lesion conditions, movement problems, and facial paresis.

Conclusion and Recommendations

T table analysis mainly provides the information that significant gender differences were found in emotional processing, which revealed male adults have more problematic emotional processing than female adults. While a similar t table provides information on pseudobulbar affect, non-significant gender differences were found. Through linear regression analysis, it was found that age is a significant predictor for emotional processing (EP), but a non-significant predictor for pseudobulbar affect. Linear regression revealed the role of emotional processing as a significant positive in pseudobulbar affect.

An educated sample was taken in the present study, so it is recommended that future studies should be conducted on a non-educated sample. Because of some restrictions and time limitations, this study has only taken gender and age to study PBA prevalence. Therefore, it is suggested that other research should study some other characters. Future research should be conducted on a large sample size, and samples should be taken from other areas of Pakistan.

Lack of awareness of PBA among everyone is a major limitation to diagnosing and treating it. PBA should be diagnosed as a separate condition, and awareness should be developed among professionals and the general population. This research study also suggests that hospital authorities should cooperate for in-

depth knowledge of new conditions. This study will contribute greatly to knowledge about the prevalence of pseudobulbar affect with respect to gender and age with the role of emotional processing in pseudobulbar affect.

Implications of the Study

Despite mentioned limitations study has major implications, and the results of the present study provide helpful information in the field of clinical psychology to know about impaired emotions leading to pathological laughter and crying. The findings help understand the prevalence of pseudobulbar affect with respect to age and gender and the role of emotional processing in pseudobulbar affect. Pseudobulbar affect is a new condition, and its differentiation is necessary from other disorders like depression and bipolar disorder. Pseudobulbar affect is embarrassing for patients and caregivers, and awareness must develop among clinicians and the general population to understand and treat this condition.

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