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Background - There is increasing interest in finding the relationship between pain, depression, behavioral disturbances and cognitive impairment in patients living in long-term care centers and predicting behavioral disturbances using chronic pain, depression and cognitive impairment as predictors. To date this is the first study identifying the relationship between pain and behavioral problems.

Methods - The study population consisted of 412 residents living in 16 long-term care centers in Dallas, Texas. Pearson product-moment Correlation was done to find the association between behavioral disturbances and pain, depression and cognitive factors. Multiple regression analysis was performed to obtain best predictors of behavioral disturbances and forward selection procedure to find out best fit model.

Conclusion - Statistically significant correlation was achieved between behavioral excess and overall pain. The correlation was statistically significant between behavioral deficit and overall pain, activity interference and depression. Overall pain, activity interference and depression are significantly inter-correlated with each other. Over all pain and activity interference were found to be statistically significant predictors of behavioral excess. Overall pain was found to be statistically significant predictor of behavioral deficit.

BEHAVIORAL DISTURBANCES, CHRONIC PAIN,

AND COGNITIVE IMPAIRMENT

IN LONG-TERM CARE CENTERS

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CHAPTER I

INTRODUCTION

Behavioral disturbances are common in residents living in long-term care centers (LTC). These behaviors contribute to care giver's stress, long-term institutionalization, and acute hospitalization (Desai & Grossberg, 2001). In United States nursing homes, the prevalence of behavioral problems ranges between 64% and 83% (Swearer, Drachman, O'Donnel & Mitchell, 1988; Zimmer, Watson & Treat, 1984). Cognitive impairment is thought to cause 50% to 90% of the behavioral problems in the elderly (Burgio, 1997; Davis, Buckwalter & Burgio, 1997; Rosen, Burgio, Koller, Cain, Allison & Fogleman, 1994). Studies have shown that cognitive impairment increases With advancing age. People older than 65 years have 5% incidence which increases to 20% in people older than 80 years (Forrey, 1997). Alzheimer's disease is the most common cause of cognitive impairment and commonly results in institutionalization (Matsuoka, Miyamoto, Ito, & Kurita, 2003).

According to the Unites States 2000 census, it has been estimated that 4.5 million Americans have Alzheimer's disease. By 2050 the number of people with Alzheimer's disease could range from13.2 million to 16 million. It has been estimated that the annual cost of caring for the patient with Alzheimer's disease is $ 47,000 (Rice, Fox, Max, Webber, Lindman & Hauck, 1993) and average lifetime cost is $174,000 per individual. In 1991, the total national costs for senile dementia were estimated to be more than $67 billion (Aronson, Ooi, Geva, Masur, Blau & Frishman, 1991). By 2010, Medicare cost

for beneficiaries with Alzheimer's disease is expected to increase 54.5 % from $ 31.9 billion in 2000 to $ 49.3 billion, and Medicaid cost on residents with dementia is expected to increase from, $18.2 billion to $33 billion in 2010. Federal government spent $640 million on Alzheimer's research in fiscal year 2003 (alz.org, 2003). By the year 2040, the number of elderly people living in nursing homes will increase to four million (Schneider & Guralnik, 1990).

It has been shown in a number of studies that, along with cognitive impairment and behavioral disturbances, pain is the most frequent problem in long-term care settings. Pain is considered to be significant factor responsible for behavioral problems (Desai & Grossberg, 2001). It is very well documented in the literature that pain is a subjective phenomenon that encompasses nociceptive, perceptual, cognitive, and emotional factors (Cipher & Clifford, in press). The estimated prevalence of pain among institutionalized elderly ranges from 45% to 80% (Ferrell, 1995).

Among nursing home residents, major sources of pain included low back pain (40%), arthritis of appendicular joints (24%), previous fractures (14%), and neuropathies (11%) (Ferrell, Ferrell & Osterweil, 1990). However, pain in the elderly often goes unreported due to the poor communication ability in patients with cognitive impairment. It was found that aggressive behaviors were observed more frequently and significantly in older people with two or more pain related medical illnesses (Feldt, Wrane & Ryden, 1998). Pain was associated with increased narcotic use, or hospital or emergency department use (Desai & Grossberg, 2001). Studies have demonstrated that people with cognitive impairment express their pain in the form of behavioral disturbances, and may

include agitation and other observable behaviors associated with discomfort (Buffeman, Maiskowski, Sands & Brod, 2001). However, little empirical data are available to identify the relationship between behavioral disturbances and pain and cognitive impairment. Nursing home residents with behavioral illness and cognitive impairment may respond to pain differently compared to the younger population (Closs, 1994). According to 2002 American Society of Consultant Pharmacists (ascp.com, 2002), indications of pain elderly patients include:

- Crying
- Increased frustration
- Changes in sleep or eating habits
- Withdrawal from friends, family, or favorite activities
- Agitated or aggressive behaviors

There are several factors that affect the perception of pain in elderly. Some of these factors are age, cognitive status, psychosocial factors, social support, gender and medical illness. Increasing age is associated with decreased perception and report of pain due to physiological, and psychological changes (Gibson & Helme, 2001). Cognitive impairment increases progressively with age (Bernabei , Gambosi & Lapapane, 1998). Because cognitive function is required for adequate communication, patients with decline in cognitive status are often unable to communicate their experience of pain resulting in under diagnosis and under treatment. Psychosocial factors include depression, fear and anxiety (Bishop, 2001; McCracken, 1999). In the longitudinal analysis by Geerlings, Twist and Beekman (2002) it was found that pain and depression are strongly associated

because of increased prevalence of both depression and medical illnesses associated with pain (Geerlings, Twisk & Beekman, 2002; Kwentus, 1985). There is evidence suggesting that life events such as bereavement, and retirement may trigger onset of pain in elderly (Roy, 1995). For older adults, widowhood, friends, support from children, and health of a spouse are some of the social issues. There is very limited research on the relation between social support and pain. It was reported that the prevalence of pain is much higher in females compared to males (Roberto, 1997). In a study with 485 older patients, it was shown that women reported more symptoms of depression, excessive sleep problems, more chronic illnesses, and also pain compared to men (Schechtman, Kutner & Wallece, 1997). The 2000 United States Census Bureau estimated that females make up 60% of the population at age 65 years and 73% at age 85 years. (U.S.Census Bureau, 2000).

Common medical conditions that result in pain in elderly are osteoarthritis, rheumatoid arthritis, temporal arteritis, polymyalgia rheumatica, osteoporosis, osteomalacia, cervical spondylosis, and angina, diabetic neuropathy, abuse of alcohol (Ferrell & Ferrell, 1990). Acute medical conditions like Herpes zoster, trigeminal neurolgia, post herpatic neurologia may cause neuropathies. It is estimated that 70% of pain in elderly is caused by osteoarthritis in elderly residents.

Levels of Cognitive Impairment

Staging of cognitive impairment is helpful both for caregivers as well as for patients in terms of identifying consequences as well as to find the underlying cause of dementing illness other than cognitive impairment. The process of dementia is usually

insidious and progresses gradually over many years. Staging can be done by assessing cognition, behavior and function. According to Alzheimer's association the development of cognitive impairment can be divided into following stages: (alz.org, 2002).

Stage 1: Cognitively normal stage

Stage 2: Very mild deficits- forgetfulness, but persons are competent enough.

Stage 3: Mild cognitive impairment: This is considered as transitional state, where the cognitive function is not normal but symptoms do not meet the criteria of dementia. Some of the clinical criteria are memory complaint, which is beyond the point what we consider for normal aging and evidenced by informant. The second criteria is objective memory impairment. Third criterion is largely preserved cognitive function such as language, attention, executive function, and visuospatial skills. People with mild cognitive impairment are able to perform normal activities of daily living, except the complex activities. Finally, these people do not meet the standard DSM-IV criteria for dementia. (Peterson, 2004).

Stage 4: Moderate cognitive decline. Patients in this stage are confused, and disoriented to time, and date.

Stage 5: Severe cognitive decline and also referred to as early dementia. Patients are disoriented to season, and place and faces difficulty in dressing appropriately.

Stage 6: Severe cognitive decline or middle dementia. Person is disoriented to spouse, and children's names, and have problems with daily activities.

Stage 7: Severe form of cognitive decline. Also referred to as vegetative stage

Etiology of Cognitive Impairment

The causes of cognitive impairment can be classified into primary and secondary causes (Forrey, 1997).

Primary Causes:

Alzheimer's disease

Extrapyramidal syndromes with dementia

Huntington's disease

Parkinson's disease

Progressive supranuclear palsy

Spinocerebellar degeneration

Wilson's disease

Secondary Causes:

Intracranial Conditions (Cerebrovascular disease, Head trauma, Hydrocephalus)

Infectious diseases (Chronic meningitis, Creutzfeid-Jakob disease, Cysticercosis,HIV infection, Lyme disease, progressive multifocal leukoencephalopathy, Syphillis, Whipple's disease).

Demylinating illnesses:

Leukodystrophy

Multiple Sclerosis

Psychiatric disorders (Bipolar disorder, Depression, Schizophrenia)

Inflammatory diseases:

Antiphospholipid syndrome

Sarcoidosis

Systemic lupus erythemosus

Temporal arthritis

Extracranial organ system disturbances (Circulation, Endocrine system, Heart, Kidney, Liver, Lung)

Toxic Conditions (Alcohol, Medications, Organic solvents)

Nutritional disorders

Folate deficiency

Vitamin B12 deficiency

Neoplasm

Subdural hematoma

Common Behavioral Disturbances

Behavioral symptoms of cognitive impairment are more distressing to the patients and to the caregivers than functional and intellectual symptoms of cognitive impairment. (Ikeda, Fukuhara, Shingenobu, Hokoishi, Maki, Nebu, Komori, Tanabe, 2004). Behavioral disturbances can be classified into behavioral excess and behavioral deficits (Burgio, 1996; Burgio, 1997; Mansfield, 1989).

I. Behavioral Excess

Behavioral excess is defined as an occurrence of a behavior that is problematic. These disturbances are observed at some point in the course of dementia.

A. Agitation is one of the most common behavioral problems (Forrey, 1997). Agitation is a collective term used to describe nonspecific physical and verbal behaviors that are commonly found in nursing homes (Chung & Cummings, 2000; Clyburn, Stones & Hadjistavropoulos, 2000; Kales, Blow & Copeland, 1999). This can be expressed in different forms and exacerbated by a number of factors. They include wandering, pacing, restlessness, inappropriate disrobing, and verbal outbursts. Sometimes people are excessively agitated and are confused. This escalating form of agitation is described as sundowning. This behavioral disturbance often results from abnormal sleep patterns and sensory deprivation, loneliness, and diminished social and physical time cues (Reynolds, 1991).

B. Disruptive vocalization includes loud requests for attention, chronic screaming, self-talk, negative remarks and use of obscenities (Cohen-Mansfield, 1986; Vaccaro, 1990). It is associated with depression (Dwyer & Byrne, 2000), physical discomfort, and aggravated by environmental stressors. It is usually exhibited during toileting, bathing or result from social isolation.

C. Wandering is frequently observed in people with poor cognition in language, memory, orientation and concentration (Algase, 1992). It is observed in 18%of nursing home residents_with mild cognitive impairment, 22% of residents with moderate level of cognitive impairment and in 50% of resident with severe cognitive deficit (Teri, Larson & Reifler, 1988; Bolger, Carpenter & Strauss, 1994). Wandering contribute more trouble to other residents and caregivers than to the patient.

D. Hoarding is a condition where the patients collect a large number of objects that are not needed. It is commonly found in dementia. (Greenburg, 1990). It interferes with hygiene and health of the patient. Patients with hoarding may sometimes become agitated and violent when someone tries to take the things away from them. It has been found that patients with hoarding exhibit higher rates of repetitive behaviors, hyperphagia, and pilfering. (Greenburg, 1998).

E. Physical and verbal aggression are exhibited in people with moderate and severe dementia (Hoeffer, Rader, Mckenzie, Lavelle & Stewart, 1997). They include spitting, pushing, grabbing, kicking, hitting and dangerous assaultive behaviors (Burgio, & Stevens, in press; Cohen-Mansfield, 1989; Lion, 1981). This is associated with depression and psychosis. Factors that predispose to this behavior are male sex, use of psychotropic drugs, dementia and younger age. Common triggers are anticipation of pain, or frustration from failure to perform daily activities (Cohen-Mansfield, Marx & Rosenthal, 1990b).

F. Resistance to daily activities and care among patients with dementia poses many problems to caregivers and lead to increased staff turnover in long-term care facilities. These includes eating habits, dressing, toileting, bathing, up time, medical compliance social/ recreational activities (Clifford, Cipher & Roper, 2003).

G. Self-destructive behaviors are common in nursing homes and majority of them are associated with dementia. These may be either direct or indirect. Direct behaviors are those which have immediate effect and result in death, injury and pain.

Indirect behaviors are those, which are harmful leading to patient death over time. In a study done by Draper et.al. (2002) indirect behaviors such as refusal to eat, take medication, co-operate with staff occur in 61% of residents and direct behaviors, such as cutting, hitting, eating foreign body substances occur in 14% of residents.

H. Disinhibition is observed in 30% of residents. Behaviors such as disrobing in public, sexual behaviors, aggression and violence are more commonly observed in mild or severe dementia. These are very difficult to manage (Kahn, Gwyther, Frances, Silver & Alexopoulos, 1998).

I. Dysfunctional Pain/Illness behaviors: Patients with dysfunctional behaviors exhibit resistance to activities of daily living. Those who need rehabilitative therapies often show refusal to these kind of treatments.

II. Behavioral Deficits

It is a situation where in non-occurrence of behavior poses problem in long-term care residents. They include:

A. Depression is observed in many cases of Alzheimer's and vascular dementia and presents with low mood states. It is evidenced from previous study that depression is often co exists with agitation in patients with dementia (Ritchie, Touchon & Ledsert, 1998). It usually not diagnosed in patients with dementia, because behavioral disturbances and aggression may mask the symptoms of depression. Sadness, suicidal thoughts, feeling of worthless are typical signs of depression (Williums, Hitchcock Noel, Cordes, Ramirez & Pigone, 2002). Depression is

often associated with physical symptoms like loss of appetite, loss of weight, trouble sleeping, multiple somatic complaints (American Association for Geriatric Society, 2001; Boswell & Stoudemire, 1996). It is estimated that the prevalence of depression in patients with cognitive impairment is 20% (Coffey & Cummings, 2000; Ballard, Bannister & Solis, 1996; Salzman, 2000).

B. Sleep disturbances may indicate depression in persons with impaired cognition (Kwentus, 2000). Abnormal sleep patterns that occur with aging are aggravated in dementia and increases its severity (Desai & Grossberg, 2001). Frequent awakenings and fragmented sleep patterns are common in patients with dementia and when associated with wandering and agitation usually results in institutionalization.

C. Low Activity Levels: Any decrease in daily activity associated with medical, painful, emotional or cognitive disorder/impairment and responsible for cognitive or pharmacological interventions.

D. Loss of weight/appetite: Loss of weight is associated with medical, painful conditions, and cognitive impairment.

Identifying the underlying cause of disruptive behavior is the best way to determine the type of management. Behavioral problems can be precipitated by internal or external stimuli and Jackson-Siegal (2003) in her presentation explained behavioral disturbances by the following nine paradigms:

A. Environment/Stressors such as overcrowding, frequent change of nursing staff, inadequate staffing (both in number and quality), death of a spouse, excess

noise, change of routine, lack of activity, unmet needs such as toileting, thirst, and hunger contribute to stress and discomfort and disruptive behaviors in residents of long-term care (Creditor, 1993; Inoouye, Bogardus & Baker, 2000).

B. Dementia has profound effect on behavior. One type of dementia that is recently identified is dementia with Lewy bodies (DLB) (McKeith, 2002). Lewy bodies are abnormal protein deposits in the brain of elderly patients with dementia. It is believed that DLB is the second most common cause of dementia after Alzheimer's disease.

C. Psychotic symptoms includes hallucinations (usually visual), delusions, paranoia, persecutory beliefs. These symptoms are exhibited by one third of patients with middle or late stage Alzheimer's disease(Chan, Praiser & Neufied, 1999). However, these may appear at any stage of dementia, any type, or at any time. Hallucinations that are observed in patients with cognitive impairment include intruders, animals, complex scenes, deceased parents, or inanimate objects. (Mendez, Martin, Smyth, 1990). The most common delusions observed are stealing, or having mis-perceptions. Delusions are observed in 73% of patients with Alzheimer's disease and other dementias (Lachs, Becker & Seigal, 1992).

D. Affective Disorder like major depression is manifested at early stages of cognitive impairment. People with depression often have trouble concentrating and making decisions and are often irritable, anxious, and have somatic complaints, and frequently exhibit social withdrawal (Moutier & Wetherll, 2003).

E. Pain is common medical condition causing behavioral disturbances and found to

be significant trigger of behavioral disturbances in patients with cognitive impairment (Desai & Grossberg, 2001). Majority of residents living in nursing homes have persistent pain and in one study it was found that behavioral symptoms decreased after treatment with acetaminophen. Other co-morbid illnesses that are manifested in the form of behavioral disturbances include dehydration, urinary tract infection, dental problems, drug reactions, congestive heart failure, polypharmacy (Desai & Grossberg, 2001).

F. Frontal lobe impairment is associated with behaviors disturbances. Frontal lobe is involved in the inhibition of behaviors that are socially inappropriate (Bowes, 2003), and its impairment in function leads to abnormal behavior.

G. Anxiety and personality disorder occur in many different conditions including pain, psychosis, delirium. Symptoms of anxiety are frequently present in people with dementia and often have associated depression (Flint, 2001). Anxiety can lead to disorganized behaviors.

H. Delirium is characterized by decreased attention and altered perception and acute state of confusion (MacDonald, 1997). Delirium is associated with many different conditions including infections and use of certain medications.

I. Personality disorder: It was presented in a clinical review by Richard Goldberg (1997) that people with personality disorders can manifest more aggressive behaviors in patients with cognitive impairment.

Management of Behavioral Disturbances

Management of behavioral disturbances requires multi-component intervention targeting both resident and caregiver. Behavior disturbances like wandering and hoarding cannot be improved by pharmacological therapy. However, non-pharmacological like behavioral interventions are mainstay of management. These therapies reduce the burden on caregivers and delay patient institutionalization. Some of the methods are:

Activity planning

Change of environment

Providing freedom of movement

Safety measures

Activities involving exercise, socialization, and recreation may help to minimize the behavior episodes. Safety measures such as providing residents with railings, and frequent repositioning while in bed reduce bedsores, which can precipitate agitation. Providing comfortable surrounding reduce patients confusion or anxiety that precipitate behavior problems. Clocks and calendars keep the patient oriented to time. Residents with decreased sensory and physical functioning should have proper assistive devices, such as glasses, dentures, hearing aids. Allowing to patient to walk or wander under supervision may decrease those behavioral problems. Another measure is avoiding the use of restrains which may exacerbate agitation, confusion, and distress. Neugroschi, 2002).

Nursing home residents with behavioral illness and cognitive impairment respond to pain differently compared to younger population. One study conducted by Brummel-Smith et al. (2002) demonstrated that pain in cognitively impaired people was associated with increased behavioral problems, narcotic use, or hospital or emergency department use in the following year. However, little attention was given to identify the relationship between behavioral disturbances and pain and cognitive impairment and depression.

To date there have been very few studies that addressed the relationship behavioral disturbances, depression and pain in cognitively impaired population. The present research used data on long-term care residents to determine the relationship between behavioral disturbances, depression, pain and cognitive impairment and to predict behavioral disturbances using pain, cognitive impairment and depression as predictors. It is believed that this research will benefit the long-term care staff and caregivers in identifying different pain behaviors that can be used to educate them in early detection reduce early hospitalization and improve the quality of life.

CHAPTER II

METHODS

1.Data Source

This study used a secondary analysis of the data collected by one of three clinical geropyschologists from 412 residents living in a total of 16 long-term care facilities in the Dallas, Texas area. Thirteen of the long-term facilities were skilled nursing units, and three were acute care facilities. There were 50 to 120 beds depending on the facility. All were for-profit organizations.

2.Study Population

For the study, all patients that were included in the were referrals during the year 2000 and 2001 from the attending physicians to a clinical psychologist for one of the following three reasons: 1) change in cognitive functioning; 2) emotional distress; 3) behavioral dysfunction associated with dementia. This could be considered as a convenience sampling procedure.

3.Measures

Geriatric Multidimensional Pain and Illness Inventory (Clifford & Cipher, in press) The GMPI is a 12-item instrument designed to assess pain and its functional, social, and emotional consequences. In the absence of pain, the GMPI assesses the severity of the resident's primary chronic medical condition and its consequences. The first item is a standard 10-point numeric rating scale assessing current pain, with 10

representing worst possible pain, and 1 representing little pain. Other items include, "How much have you suffered because of your pain or illness this last week?", and "How irritable have you been this last week because of your pain or illness?" Fourteen items were factor-analyzed with oblique rotation to identify item clusters. All items are rated on 10-point scale, with each point associated with specific criteria. Fourteen items were factor-analyzed with oblique rotation to identify item clusters. Three subscales were created from 12 items and two items were deleted, as they did not load on either of the factors. The subscales were "pain and suffering", and "Activity Interference". All these factors were significantly correlated. Higher values are indicative of higher levels of pain, and higher levels of functional / social / emotional difficulties. Each GMPI was verbally administered to the resident by the clinical geropsychologist, after getting information from nursing staff and family members involved in the resident's care.

Neurobehavioral Cognitive Status Examination (NCSE; Kiernan, Mueller, Langston & Van Dyke, 1987). This is a cognitive screening examination that is different than previous instruments for testing cognitive function and designed to give cognitive assessment of behaviorally disturbed patients in acute diagnostic units. The Neurobehavioral Cognitive Status Examination (NCSE) is a psychologist-administered examination of impairment in orientation, repetition, naming, attention span, comprehension, short-term memory, constructional ability, social judgment, and calculation. The ten subscales were combined to create a composite score for each resident, using principal components analysis. Higher scores indicate more cognition and lower score indicate low cognition. This is a commonly used data reduction method for

items that measure one global concept – in this case, cognitive impairment (Tabachnick & Fidell, 2001; Stevens, 1992).

Geriatric Depression Scale (GDS; Yesavage, Brink & Rose, 1983). The shortened (15-item) version of the GDS is a clinician-rated inventory that assesses depression. The GDS was standardized specifically toward the elderly population. This scale has same sensitivity, specificity and positive predictive value to that of 30-item GDS scale. An example of item is " Do you think it is wonderful to be alive?". Respondents answer each item with either "Yes" or "No". Score 1 indicates "Yes" for questions 2-4, 6-8, 8-10, 12, and 14-15. Score 1 indicates "No" for questions 1, 5, 7, 11 and 13. Scores range from 0 to 15. The 15-item version has good interrater reliability, with values ranging from .70 to .87 (Van Marwijik, Wallace, De Bock, Hermans, Keptein & Mulder, 1995). Higher GDS values are indicative of higher depression.

Behavioral Disturbances. Residents were rated on the average intensity, frequency, duration and number (frequency) of each of 26 possible behaviors, including agitation, verbal aggression, withdrawal, and physical aggression. Ratings were made on a 7-pronged scale, with higher numbers representing more intensity/frequency/duration. They included physical combativeness, verbal aggression, agitation/sun downing syndrome, resistance to ADLs, non-compliant behavior, distressing repetitive behavior, distressing delusional behavior, yelling, socially disruptive behavior, depression, withdraw, helplessness, low motivation, suicidality, unrealistic demands, dysfunctional pain/illness, public disrobing, sexual behavior, wanting to go home, wandering, volitional incontinence, loss of weight or appetite, pillaging, hoarding, unsafe impulsive behavior,

low activity, sleep problems. The level of dysfunction was rated as 1 representing, tolerable level, less than twice a month, and lasting for 1 to 2 minutes. Scale of 7 representing behavior which poses immediate danger towards self or others and continuous and lasting equal or more than 4 hours a day. Scale of 1 indicated tolerable behavior, occurring less than twice a month and lasting for 1 to 2 minutes. These ratings have been evidenced to have excellent internal consistency ($\alpha = .96$). Test-retest co-efficients have ranged between .86 to .94 among the three raters.

4. Statistical Analysis

Frequency distributions were carried out for race, and persistent pain. Descriptive statistic was obtained for percent of pain experienced. The bivariate relationships between behavioral excess and deficits and pain, cognitive impairment and depression were analyzed using the Pearson product-moment correlation (Rosener, 2000). Multiple linear regression analysis with forward selection procedure was used to examine the predictors of behavioral excesses and deficits with standardized scales using scores of geriatric depression scale, cognitive impairment and pain (Kleinbaum, Kupper, Muller & Nizam, 1998). All data analysis was done using SPSS 12.0 (Statistical Package for the Social Sciences, Student Version 12.0 for Windows).

CHAPTER III

RESULTS

Of the 412 cases 29 cases were missing and eliminated from analysis. Seventy percent of the sample consisted of females, and average age was 82 years (SD=9.3). The characteristics of the sample were shown on the tables 1 and 2. The sample was predominantly Caucasians (89%), followed by African-Americans (4%), and Asians (2%). Seventy one percent reported persistent pain (pain experienced most of the day) and /or recurrent pain (pain experienced most days of the week).

Pain was experienced 68% of the time on average. Ninety three percent of residents have mild/ moderate cognitive impairment indicated by NCSE and some kind of behavioral disturbances. The mean for behavioral excess was 4.3, SD= .92, behavioral deficit was 4.4 with SD= .86 and for geriatric depression scale was 7.3, SD= 3.3. Residents were suffering from more than two chronic medical conditions on average (Mean = 2.7, SD=1.8), the most common condition being was hypertension (43%), followed by coronary artery disease (33%), cerebral vascular damage (26%), diabetes (22%), congestive heart failure (21%), atrial fibrillation (18%), chronic obstructive pulmonary disease (17%), and kidney disease (7%).

The results of correlation coefficients were shown in the tables 3 and 4. As shown

in the table 3, the behavioral excess was significantly correlated with overall pain levels. $r(201) = 0.151$, s, $p < 0.05$ at 0.05 significant levels. However, R^2 was only 0.02 indicating that only 2% of variation in behavioral excess can be explained by overall pain. The relationship between behavioral excess and GDS was not significant $r(306) = 0.08$, ns, $p > 0.05$). Behavioral deficit was significantly correlated with GDS score $r(295) = 0.135$, s, $p < 0.05$) with R^2 0.01, overall pain levels $r(290) = 0.148$, s $p < 0.05$ and activity interference $r(320) = 0.207$, s, $p < 0.05$ at 0.05 levels with R^2 values 0.02 and 0.04 respectively. These small R^2 values might be caused by non linear associations between behavioral deficit and GDS, overall pain and activity interference. There was no correlation between NCSE and behavioral deficit $r(288) = 0.082$, ns, $p < 0.05$). The correlation was significant between GDS and overall pain $r(306) = 0.242$, s, $p < 0.05$), and activity interference $r(353) = 0.402$, s, $p < 0.05$), and NCSE $r(327) = 0.124$, s, $p < 0.05$).

Table 5 and 6 presents the results from the multiple regression model for behavioral excess and deficit as dependent variables using GMPI subscales, GDS, and NCSE as the predictor variables (full model). By reviewing table 5 and 6, one is able to see overall pain was the statistically significant predictor for both behavioral excesses and deficits ($\beta = -0.305$, $p < 0.05$, $R^2 = 0.072$ and $\beta = 0.168$, $p < 0.05$, $R^2 = 0.064$) respectively. For behavioral excess, activity interference was significant predictor (($\beta = -0.198$, $p < 0.05$) in addition to overall pain levels.

Table 7 and 8 presents the final model, which was obtained by using forward stepwise regression using behavioral excess and deficit as criterion variables, with GMPI

subscale, GDS score, NCSE as predictor variables. Looking at tables 7 and 8, one can see that the significant relationship that prevailed was overall pain for both behavioral excess ($\beta = 0.028$, $p < 0.05$, $R^2 = 0.032$ & 0.058) and deficit ($\beta = 0.2$, $p < 0.05$ $R^2 = 0.04$). The GDS, NCSE and activity interference added no predictive value and were dropped from the model.

TABLE1: Ethnic Breakdown of Sample

Race	Frequency	Percent
Asian	2	0.5
American Black/African American	16	3.9
Hispanic/Latino	7	1.7
Native American	1	0.2
Other	6	1.5
Caucasian	368	89.3
Total	412	100.0

TABLE 2: Frequencies of Persistent Pain

Percent of residents with Persistent Pain	Frequency	Percent
Yes	294	71.4
No	115	27.9
Total	409	99.3
System	3	0.7
Total	412	100.0

TABLE 3: Pearson Correlations Between Average Intensity of Behavioral Excess and Geriatric Depression Scale, Overall Pain, Activity Interference, and NCSE composite index

	1	2	3	4	5
		Residents (n=412)			
1.Excess	1	-0.023	0.151*	0.043	-0.084
2. Geriatric Depression Scale		1	0.242**	0.402*	0.124*
3. Overall pain Levels: GMPI			1	0.409*	0.135*
4. Activity Interference: GMPI				1	0.024
5. NCSE Composite Variable					1

* Correlation is Significant at 0.05 level (2-tailed)

** Correlation is Significant at 0.01 level (2-tailed)

$r(201)_{0.95} = 0.15$

GDS: Geriatric Depression Scale
GMPI: Geriatric Multidimensional Pain and Illness Inventory
NCSE: Neurobehavioral Cognitive Status Examination

TABLE 4: Pearson Correlations Between Average Intensity of Behavioral Deficit and Geriatric Depression Scale, Overall Pain, Activity Interference, and NCSE composite index

	1	2	3	4	5
		Residents (n=412)			
1.Deficit	1	0.135*	0.148*	0.027*	-0.082
2. Geriatric Depression Scale		1	0.242*	0.402*	0.124*
3. Overall pain Levels: GMPI			1	0.409*	0.135*
4. Activity Interference: GMPI				1	0.024
5. NCSE Composite Variable					1

* Correlation is Significant at 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed).

$r(295)_{0.95} = 0.13$; $r(290)_{0.95} = 0.14$; $r(320)_{0.95} = 0.02$

GDS: Geriatric Depression Scale
GMPI: Geriatric Multidimensional Pain and Illness Inventory
NCSE: Neurobehavioral Cognitive Status Examination

TABLE 5: Multiple Linear Regression of Behavioral Excess with Overall Pain , Activity Interference, Depression and NCSE composite index as predictors. -Full Model

Variable	Unstandardized B	Standard Error SE B	Standardized β
Model			
Constant	4.278	0.273	
Geriatric Depression Scale Score	0.001	0.023	-0.033
Overall pain Levels: GMPI	0.142	0.042	-0.305*
Activity Interference: GMPI	-0.097	0.046	-0.198*
NCSE Composite Variable	-0.112	0.072	-0.120

* Statistically Significant predictor at 0.05 level

Note. R=0.268, R^2= 0.072

GDS: Geriatric Depression Scale
GMPI: Geriatric Multidimensional Pain and Illness Inventory
NCSE: Neurobehavioral Cognitive Status Examination

TABLE 6: Multiple Linear Regression of Behavioral Deficit with Overall Pain, Activity Interference, Depression and NCSE composite index as predictors. -Full Model

Variable	Unstandardized B	Standard Error SE B	Standardized β
Model			
Constant	3.660	0.239	
Geriatric Depression Scale Score	0.009	0.018	0.33
Overall pain Levels: GMPI	0.073	0.030	0.168*
Activity Interference: GMPI	0.053	0.035	0.108
NCSE Composite Variable	-0.105	0.061	-0.109

* Statistically Significant predictor at 0.05 level

$R = 0.254$, $R^2 = 0.064$
a Dependent Variable: deficit

GDS: Geriatric Depression Scale
GMPI: Geriatric Multidimensional Pain and Illness Inventory
NCSE: Neurobehavioral Cognitive Status Examination

TABLE 7: Forward Entry Regression Model of Overall Pain, Activity Interference predicting Behavioral Excess- Final Model

Variable	Unstandardized B	Standard Error SE B	Standardized β
Model			
Constant	3.879	0.182	
Overall pain Levels: GMPI	0.083	0.035	0.180*
Overall pain Levels: GMPI	0.130	0.041	0.280
Activity Interference: GMPI	-0.092	0.043	-0.189

* Statistically Significant predictor at 0.05 level

Note. R= 0.180 (a) R^2 = 0.032 R= 0.241(b) R^2= 0.058

TABLE 8: Forward Entry Regression Model of Overall Pain, predicting Behavioral deficit- Final Model

Variable	Unstandardized B	Standard Error SE B	Standardized β
Model			
Constant	4.011	0.143	
Overall pain Levels: GMPI	0.087	0.028	0.2*

* Statistically Significant predictor at 0.05 level

Note. R= 0.2 (a) $R^2 = 0.04$

CHAPTER IV

DISCUSSION

This study evidenced the relationship between behavioral disturbances and pain, depression, and cognitive function. Behavioral disturbances are important symptoms in older people with cognitive impairment that affect the quality of life of residents as well as family members. These behavioral disturbances result in early institutionalization and are responsible for caregiver stress and family stress. The primary value of this study lies in the evidence showing the significant associations between behavioral excess and overall pain in cognitively impaired residents. This study results support previous studies indicating that patients with cognitive impairment may manifest their pain in different ways like crying, screaming, hitting, and being irritable (Farrell, Katz & Helme, 1996).

Significance was achieved between behavioral deficit and GDS as well as GMPI subscales assessing pain, and functional limitation. Previous research evidenced that residents with pain were not able to perform routine as well as complex activities of daily living and these activity restrictions can lead to symptoms of depression (Williamson & Schulz, 1992). GMPI subscales of overall pain and activity interference and GDS were significantly inter-correlated with each other in our research. This finding supported the finding of the previous studies by Parmelee et al. (1991) and Casten et al. (1995) in which patients with depression report more intense pain and large number of complaints than people without depression. In a study by Williamson and Schulz (1992) showed the importance of activity restriction and its mediating role between pain and symptoms of

depression.

Previous research by Cohen-Mansfield (1985) indicated that behavior disturbances, particularly agitation are strongly associated with cognitive deterioration. Residents in the Cohen-Mansfield study exhibited cognitive function that vary from normal range to severe level of cognitive decline (Cohen-Mansfield, 1985) that is measured by brief cognitive rating scale (BCRS). However, our study found no significant relationship between behavioral disturbances and NCSE scores. This discrepancy can be explained by the fact that the all residents in our study sample were having mild or moderate cognitive impairment and cognition is measured using the NCSE scale.

In our study, overall pain was found to be a statistically significant predictor of behavioral excess and deficit. This indicates that presence of aggressive behaviors and behavioral deficits are, to a certain extent, indicators of pain and, and treatment of pain might reduce the prevalence of behavioral problems. The results support the study described by Jackson-Siegal (2003) carried out on nursing home residents who were suffering from arthritis pain and exhibiting behavioral disturbances. Treatment of pain in those patients with analgesics improved their behavioral disturbances compared to those who were not taking pain medications. In a research described by Feldt, Warne (1998), it was revealed that residents with pain causing diagnosis scored higher on RAS2 (Ryden Aggression Scale, form 2) scale which measures aggressive behavior, compared to subjects without pain related illness. Results of the study by Williamson and Schultz (1992) evidenced that residents with depression experience more pain compared to those

without depression. In addition to pain, activity interference was a significant predictor of behavioral excess. Because pain interferes with the ability to perform daily activities, nursing home residents may express this disability in the form of behavioral problems like frustration and aggression. However, the predictive power was not very strong in both behavioral excess as measured by R-Square (coefficient of determination). This is explained by lack of other contributing factors that might be responsible for the occurrence of behavioral problems.

CHAPTER V

LIMITATIONS AND STRENGHTHS

Limitations of the Study

There were some limitations to this study. A physician referred LTC residents to a psychologist. Therefore, this sample is a convenience sample and was not randomly selected from a greater LTC population. It included residents with mild to moderate cognitive impairment who have exhibited aggressive behaviors consistently. Therefore sample was not representative of those with cognitive impairment and who were not aggressive. The majority of participants in this study were Caucasians (89%). There may be cultural differences in behaviors exhibited by different ethnic groups. This study was based on a convenience (non-probabilistic) sample. Therefore, inference to the elderly population may be taken with caution, as selection bias may be present. Another limitation for -this research was that, this study did not take etiology of cognitive impairment or pain into consideration. Other factors associated with cognitive impairment and pain that can be confounders were not considered. Cognitive impairment and pain were assessed at the same time using cross-sectional data. Therefore, the temporal relationship was not possible to establish (which one appeared first). However, there was enough evidence in the literature indicating the temporal relationship of this process. The final limitation was that patients with acute pain or residents with severe cognitive impairment were not included in the study thus decreasing the degree of contrast that this process may have.

However, these patients are known to have a high degree of confusion and inability to express their pain during an interview.

Strengths of the Study

Our study specifically focused on older adults living in nursing homes with mild and moderate cognitive impairment and complaints of pain. The GMPI scale is a clinically rated instrument used in this study to assess pain and its functional, social, and emotional consequences. It has evidence of high reliability, which has evidence of good internal consistency as well as good convergent and discriminant validity compared to VAS (Visual analog Scale) three-point scale. The NCSE scale that was used in this study quickly identifies intact areas of functioning and provides more detailed assessment in areas of dysfunction. It was the first study to assess the relationship between pain and cognitive impairment, geriatric depression as well as pain and behavioral disturbances in long-term care facilities. The data collection was conducted with the cooperation and assistance from long-term care staff and caregivers that are highly motivated and were eager to work in the study.

CHAPTER VI

CONCLUSION

Behavioral problems are the most troublesome problems for nursing staff as well as for families of the patients. Since the population of elderly people is growing rapidly, the number of nursing homes are increasing to meet the demands of older people suffering from chronic pain related illnesses, cognitive impairment and exhibiting behavioral disturbances.

The findings of our study suggested that there was significant association between behavioral disturbances and pain, depression and activity restriction. Also pain is a statistically significant predictor of behavioral disturbances. We believe that identifying and treating pain and its associated activity restriction will reduce behavioral disturbances in nursing home residents.

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