

8-22-2008

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**Comparison of Chronic Depression Inventory Scores of Children Diagnosed with
Chronic Renal Disease at Two Points in duration of their illness**

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ABSTRACT

Hypothesis: Children with a diagnosis of chronic renal disease (CRD) for longer than 2.5 years will have higher T-scores of the Childrens Depression Inventory (CDI) as compared to children with CRD who have been diagnosed with less than 2.5 years ago.

Background: Current estimates are that 7.4 million Americans suffer from chronic renal disease. The annual incidence of pediatric kidney disease is 15 per million, ages 0-19. CRD is a serious and progressive disease affecting many different aspects of a child's life. Studies to date have examined the correlation between depression and chronic kidney disease in adults. One study noted 40% of adults with kidney disease also suffered some type of depressive disorder. Research involving children has been very minimal. There is not much research to see if a child has depressive symptoms or if they get better or worse over the duration of their illness. Pervious studies have shown children with chronic medical problems tend to be at higher risk of suffering from depression. **Methods:** This project will use pediatric patients who are receiving treatment at the University of New Mexico pediatric nephrology clinic. These patients are part of a larger study involving children with CRD and comparing them to the general pediatric population. Thirty-two children between the ages of seven and seventeen, who are currently being treated for a chronic renal disease, will be identified using certain established eligibility requirements. Each patient will be given a CDI, which is standardized survey that assesses depression in children aged seven to seventeen. Each survey will generate a T-score. A T-score above 65 indicates the child may be experiencing some depressive symptoms. The results will then be categorized into two

groups. Those that have had a diagnosis of CRD less than 2.5 years in one and those greater than 2.5 years in another. The mean score for these two groups will then be analyzed using a Two-sample t-test. Expected results: It is expected that children who have had a diagnosis of CRD greater than 2.5 years will show more depressive symptoms, based on CDI survey results. **Conclusion:** This study provides some more information on children and CRD. The results show that children diagnosed with CRD less than 2.5 years did have higher overall T-scores. Being a small study it is difficult to make any major conclusions, however it did appear to show a trend that children in the earlier stages of kidney disease maybe at risk for depressive symptoms.

RESEARCH QUESTION

The hypothesis of this project is that children who have been diagnosed with chronic renal disease (CRD), for longer than 2.5 years will have higher scores on the Childrens Depression Inventory (CDI), meaning more depressive symptoms when compared with those children with CRD who have had a diagnosis of less than 2.5 years.

Introduction

It is estimated that 7.4 million Americans suffer from chronic kidney disease and of those close to 400,000 were being treated for End Stage Renal Disease (ESRD) (1). Chronic kidney disease treatment is a long process and in many cases the adult or child will eventually need dialysis or transplantation.

Since 1970's, treatments for kidney disease in children have greatly improved. While pediatric kidney diseases are uncommon, with annual incidence rates ranging from 11-69 children per million (2), improved dialysis techniques, surgical procedures and medications provide a better prognosis for affected children. However, like most chronic

illnesses, chronic kidney disease seriously affects people's lives as they deal with the stress and responsibilities associated with disease management and the prospects of a shortened lifespan (3). One of the more common problems associated with chronic renal disease are mood disorders, such as depression and or anxiety (3).

Most of the research literature on depression and kidney disease has focused on the adult population (4,5,6,7). Several adult studies have shown that there is high psychiatric comorbidity with patients suffering from some type of depressive disorder (8). Given these high numbers in adult population it would be beneficial to see if children are suffering at the same rate. Also, many of the studies have not looked at how their depressive symptoms relate to the chronicity of their illness (9). Kimmel (2005), notes that often these studies are not longitudinal so there is not much research if the patients getting better or worse over the duration of their illness (10).

In this study will attempt to gain a better understanding of depression among children with chronic renal disease and determine if there is a difference in the prevalence of depression in those who have been diagnosed with CRD for greater than two and half years as compared to those children diagnosed with CRD less than two and half years. Based on the raw data a point of 2.5 years was chosen for two reasons: One by doing this it allowed us to have two close to evenly divided groups thus making it more feasible statistically. Second, two years in a child or adolescents life is a significant amount of time in comparison to an adult. There are stages of emotional and physical development that occur at this time. An illness during this critical period can lead to disruption of these stages and result in ensuing problems (11).

The research participants will be between the ages of seven and seventeen with a

diagnosis of CRD. Using a Children's Depression Inventory Scale, we will measure to see if there is any change in their emotional profile, as related to duration of illness.

Primary research in this area has focused on adults and depression. This study hopes to address an area that is lacking.

Currently there is an ongoing study at UNM Hospital that is comparing the emotional profiles of children with chronic renal disease with regard to depression as compared to children in the general pediatric population. This study will use the data obtained from children with chronic renal disease.

Background Research and Rationale

CRD is a progressive disease. It is defined by a gradual and progressive loss of the ability of the kidney to excrete waste, concentrate urine, and conserve electrolytes. Many children will eventually require dialysis or kidney transplantation. As kidney function deteriorates, the impact on health becomes more pronounced: children require more medications and increased doctors' visits (12). Children diagnosed with chronic renal disease are challenged by many stressors including loss of kidney function, development of digestive and neurological disorders, bone disease, anemia and decreased physical activity. It has been shown that symptoms of medical illness and the social and psychological responses to a chronic, debilitating illness might cause or exacerbate depression (13).

Other research has shown that mood disorders are common in children and adolescents with chronic disease (14). Previous studies have noted that children with conditions such as cancer, cystic fibrosis, asthma, diabetes and epilepsy may be accompanied by symptoms of depression and anxiety (15). One study looking at children with chronic

medical conditions found that probability of the development of depression increases as the extent of limitation of daily activities increases (16). This study also found that in children with chronic medical problems, ratings of depressive symptoms exceeded averages for control subjects. The 9% rate of depressive disorders in this population exceeds the rate of 5% typically reported in community samples. As mentioned earlier many studies have been done on adults with kidney disease and its psychological effects. Among adults with end stage renal disease, it has shown that depression is the most common psychological disorder (17).

By observation in general, depression seems to be common in children with chronic renal failure. At the University of New Mexico, the Child and Adolescent Psychiatry Consult Liaison Service is frequently consulted to assess for depression in children with CRD admitted to the general pediatric ward. Typical symptoms for depression include negative mood, sense of worthlessness or hopelessness, difficulties concentrating, and disturbance in sleep or eating patterns, lack of energy and thoughts of death or suicide. Based on observation it becomes apparent the need to properly assess the mental health needs of the child and offer services if appropriate. In order to address the needs of the patient it is necessary to screen these children for depression and assess the children periodically through the course of their illness. Upon literature review it was found that there is extremely limited research on studying the correlation of depression and duration of illness in children. This study will attempt to provide data in this area.

METHODS

Measures:

There are several forms of screening for depression and many are used in a variety of settings. For the purpose of this study a standardized survey will be used. The CDI is the most widely used self-report scales for measuring depression in children (18). The CDI, developed by Kovacs, is a 27 item self-rated survey designed to assess cognitive, behavior and neuro-vegetative signs of depression in children. (19). Each item consists of three statements from which the child is instructed to choose the one statement that best describes them over the last two weeks. Half of the times the most negative statements are first, the other half it is reversed. Each question is designed to assess specific symptoms of depression and the three choices range from mild or limited symptomatology to severe or maladaptive symptomatology. Each item scored 0, 1 or 2, with score of 2 representing the most severe choice. Total scores on the CDI range from 0 to 53 and T-score from 34-100. The CDI is the best-validated and most widely utilized self-report measure of children's depression (20).

To eliminate problems involved with reading level of the child or adolescent, the General Clinic Research Center (GCRC) nurse or student co-investigator will read to the child or adolescent the items. The self-report survey should take the child about fifteen minutes to fill out. The CDI: P will take less than 10 minutes for the parent/legal guardian to complete. For the purposes of this study the CDI: P will not be used.

Participants:

Thirty-two children or adolescents with CRD were recruited from the Pediatric Nephrology Clinic to take the CDI. These participants are part of a larger study, which involved comparing patient and parental CDI surveys to a control group of general pediatric patients. This research will only assess using completed patients surveys, with no control comparisons. GCRC nurse will screen for patients eligibility using the following criteria: chronic renal failure, no concomitant significant chronic medical condition and no mental retardation. The nurse will approach the treating nephrologist and ask that he/she discuss the study, obtain parent and child permission to talk with research nurse and provide introduction to the GCRC nurse. At the time of recruitment it will not be known how long the patient has had a diagnosis of CRD. Participants qualifying for the study will be between the ages of seven and seventeen. Both patient and parent/legal guardian must agree to participate in the research. All patients meeting criteria will be approached. Once a potential participant is identified they will be given an information sheet, which gives a brief description of the study, what it entails, risks/benefits of the study, and will ask if they are willing to participate in the study. If the patients and parent/legal guardian agree to participate, the nephrologist will direct the patient and parent into another room. There the GCRC nurse or student co-investigator will attain consent from the parent and consent from the child. The consent forms will be read to both the parent and child aloud while they follow along with their copies. For children age's seven to eleven, there is a separate form that they must sign. If the patient and parent/legal guardian are not excluded from the study and they have signed the consent form, then the patients and parent/legal guardian's names, address and

phone number will be recorded in a participation log. The parent/legal guardian will be asked to fill out a mental health form, a demographic sheet and HIPPA forms. Once this is complete the CDI will be administered to the parent and child separately. Upon completion of survey the patient will be able to choose from several small gifts for participation in the study.

Before the patient has left the clinic, the student co-investigator or GCRC nurse will screen the survey to see if the patient may be acutely suicidal. This will be done by checking the response for question #9, and seeing if the item "I want to kill myself" has been marked. If the patient has marked this, the Child Psychiatry Consultation Liaison Service or the UNM Psychiatric Emergency Services will be contacted to perform an immediate evaluation of the child to assess suicide risk.

In order to ensure confidentiality patients will be assigned a three-digit number, which will be written on patient's materials. The master list of patient's names, addresses, phone numbers a code numbers will be then locked in a box in the GCRC research office and separated from patient's survey materials. The master list will be destroyed within 2 months of completion of all data collected to minimize risk of break in confidentiality.

Statistical Methods:

The mean T-score for both groups will be compared using a two-tailed sample t-test. The T-scores used from the CDI, are standardized scores that have a mean of 50 and standard deviation of 10. This test will allow us to evaluate patient's depressive symptoms over a course of time. With help of a statistician a power analysis was completed. The sample size gives us 80% power detection. This would detect a difference of 10.2 between the two means of the groups. Assuming a standard deviation of 10 and an alpha level of .05.

Possible Difficulties:

This is a record review project, therefore; we do not anticipate any physical, psychological or social risk to participants in this study.

In regards to survey, one of the problems of screening children for depression in a medical setting is that this becomes more complicated in children suffering a medical illness. This is because some of the physical symptoms that are usually considered to be part of depression may be result of the disease itself. For example, lack of energy may be more due to the lack of proper kidney function rather than from depression.

As mentioned above, if a patient has marked “ I want to kill myself” on question #9, resources will be contacted, this may include UNM Child Psychiatry Liaison or UNM Psychiatric Emergency Services for immediate psychiatric/mental health evaluation to evaluate any suicidal risk.

CDI questionnaires will be scored within seven days. If a patient T-score is above 65, which indicates he or she may be suffering from depression, a strong attempt will be made to contact parents/legal guardian within 48 hours. At the time of contact, it will be recommended that the patient be seen by a mental health profession for evaluation.

Limitations and Bias's

There are several limitations to this study. In regards to size, renal diseases are relatively uncommon and it makes it difficult to get a large broad sample. Secondly, we are looking at two time reference points in what is a continuous and progressive disorder; the children's response may be more reflective of the progression of their disease. Third, it is difficult in choosing the 2 most appropriate points in time to compare the effects of their illness relative to depression. Finally, some children have already been diagnosed with

depression and are receiving treatment, which can affect their responses and depending on their progress in treatment the overall results.

Results

In all 32 patients completed a Children's Depression Inventory survey at their regularly scheduled UNM Nephrology clinic appointments. The data was collected from January 2005 thru February 2006. Initially thirty-two patients consented; one was excluded for not completing survey in its entirety. A total of thirty-one subject data points were used. Based on the raw data a point of 2.5 years was chosen for two reasons: One by doing this it allowed us to have two close to evenly divided groups thus making it more feasible statistically. Second, as mentioned earlier two years in a child or adolescents life is a significant amount of time in comparison to an adult. There are stages of emotional and physical development that occur at this time. By using 2.5 years we feel it would be ample duration of illness to note any effects that CRD may have on the participant. Results in Table 1 show that children with less than 2.5 years with renal disease had an average T-score of 51.2, as opposed in Table 2 those greater than 2.5 years had an average of 43.5, a difference of 7.7. This can be explained if one looks at the subset of scores in the first group: within this group there were 8 scores above 65, ranging from 66-86. Whereas in the group with scores above 2.5 years there was only one subset score above 65.

Using a two-sample T-test power analysis the power of the study determined to be .80, with a P value of .01, thereby rejecting the null hypothesis. Results are contrary to the initial hypothesis that children with greater than 2.5 years would score higher on depressive symptoms scale.

Patient Baseline Characteristics

Patients ages were between seven to seventeen years of age, mean age of 12.9 years.

There were fifteen females and sixteen males total. Ethnic make up included three African Americans, fourteen Hispanics, five Native Americans and nine Caucasians.

Each of the individuals has some type of documented chronic renal disease.

In the group diagnosed less than 2.5 years there were seven males and five females, ranging from ages nine to seventeen years of age, with a mean age of 13.5 years. Five of these participants were actively receiving some type of mental health counseling and or on antidepressant medication. Their duration of diagnosis ranged from two to thirty months.

In those greater than 2.5 years diagnosed there were eight males and seven females, ranging from ages seven to fifteen, with a mean age of 12 years. Of these, three were actively receiving counseling and or antidepressant medications. Their duration of illness ranged from thirty-six months to fifteen years.

CDI scores

The overall mean T score for those diagnosed less than 2.5 years with CRD was 51.2. In the case of those greater than 2.5 years it was 43.5. A two-tailed t-test was completed using the mean T score between the two groups. The results were significant with a $p=.01$.

Using the CDI interpretive guidelines for CDI T-scores, a T-score between 45-55 is interpreted as average, and a score between 40-44 is slightly below average. Based on this even though there was a difference in T-scores they both overall fall in the normal range.

Within each CDI there are five domains: (A) negative mood, (B) interpersonal problems, (C) ineffectiveness, (D) anhedonia, and (E) negative self esteem. In the group less than 2.5 years 6 individuals did score above 65 in one of these domains. In the group with greater than 2.5 years, only one individual scored in one domain above 65.

The mean T-score for both groups is shown in Tables I and II.

TABLE I

Children with Renal Disease Less than 2.5 years

Domain	Mean T-score
Negative Mood	52.0
Interpersonal Problem	52.2
Ineffectiveness	45.4
Anhedonia	52.0
Negative Self Esteem	48.0
Overall Average	51.2

TABLE II

Children with Renal Disease Greater than 2.5 years

Domain	Mean T-score
Negative Mood	46.0
Interpersonal Problem	46.3
Ineffectiveness	44.0
Anhedonia	45.0
Negative Self Esteem	44.2
Overall Average	43.5

In comparing both groups one can see that in each of the domains children with CRD less than 2.5 years had higher average T-scores overall.

Discussion

This study provides some insight into an area with limited research involving children with chronic renal disease and depressive symptoms over duration of their illness. Previous research in this area has mainly focused on the adult population (6). Using Childrens Depression Inventory Scale, it provided information in five different areas of depressive symptomology. The initial results appear to contradict our hypothesis, it shows that children with CRD less than 2.5 years had higher overall T scores and in each of the 5 categories that are measured in the CDI. It must be noted that even though T-scores were higher, they were still in the normal range overall.

Our limited data set appears to indicate that children in the early stages of their disease are at possible risk of suffering from depressive symptoms. The larger study from which this project was part of “Emotional Profiles in Chronic Renal Failure and Control Kids” found that there were no statistically significant differences between both groups in terms of depressive symptoms. However, there data showed higher overall rates, as compared to national statistics, of depressive symptoms for the renal and control group. These results along with this study may reflect a national trend that indicates as many as one in eight adolescents has clinical depression (Center for Mental Health Services, U.S. Depart. Of health and human services, 1996). Population studies show that at any one time between 10 and 15 percent of the children and adolescent population have some symptoms of depression (21). Estimates of 1-year prevalence rates in children range from 0.4 to 2.5 percent and in adolescents, considerably higher (in some studies, as high as 8.3 percent) (22).

As for New Mexico, the most recent data in 2004 shows that approximately 9% of 12-17 year olds in 2004-2005 experienced at least on major depressive episodes (National Center for Health Statistics and Bureau of Census). Our results do not indicate the children suffered major depressive disorder. In the future looking at the stage of their CRD in regards to emotional well being would be beneficial.

As mentioned earlier this study has a number of limitations: One it has a small sample size of 31. Given this is a rare disease and only done in one center in a state of 1.3 million, it was difficult to enroll greater number of participants.

Second, this study was done in one institution involving one clinic, thereby limiting the generalizability of the results. Also, nearly half of the participants were Hispanic; previous studies have shown that CDI total scores for Hispanics have been found to have been significantly higher than Caucasians (23). Other factors that may have altered the results are, New Mexico is one of the poorer states in the US and poses many obstacles in accessing health care. Some of these include living long distance from clinic, lack of transportation, language and cultural barriers, which can influence one's emotional state. Data for New Mexico shows that of the 9-17 year olds who suffer from some sort of mental health disorder, 23.2% are in poverty (US Dept of Health and Human Services, 2002). Interpretation of this study should note that in most studies along with an assessment tool there is also a clinical interview and or direct observation. For the purposes of this study only a depression inventory was used. In future studies the use of clinical interview would be pertinent to have a more thorough assessment.

Conclusion

Chronically ill children go through many ordeals during their course of illness. The amount of data on children and adolescents with renal disease and the psychological impacts is limited. In this small study there appears to be some evidence indicating that there may be an area of need for this population. It is well known that physical stressors, such as illness can precipitate or increase symptoms of depression. To the very young child he or she may be unable to work towards self sufficiency or to stay abreast of school work. In

adolescents and young adults it may be an obstacle that prevents them from becoming independent (24).

In adults, data confirms an association between depressive symptomology and morbidity, perception of quality of life and mortality in patients with end stage renal disease (25). Longitudinal studies and studies correlating depressive symptoms and kidney disease in children and adolescents are needed. This risk factor once identified could be treated with clinical intervention and likely improve the quality of life for someone already bearing the burden of a chronic illness.

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