

Duquesne University

Duquesne Scholarship Collection

Undergraduate Research and Scholarship Symposium

2021-04-12

Effects of Socioeconomic Status on Glycemic Control in Children and Young Adults with Type 1 Diabetes

Julianna Morgan

Follow this and additional works at: <https://dsc.duq.edu/urss>



Part of the [Pediatric Nursing Commons](#)

Effects of Socioeconomic Status on Glycemic Control in Children and Young Adults with Type 1 Diabetes. (2021). Retrieved from <https://dsc.duq.edu/urss/2021/proceedings/6>

This Paper is brought to you for free and open access by Duquesne Scholarship Collection. It has been accepted for inclusion in Undergraduate Research and Scholarship Symposium by an authorized administrator of Duquesne Scholarship Collection.

**Effects of Socioeconomic Status on Glycemic Control in Children and Young Adults with Type 1
Diabetes**

Julianna G. Morgan

Duquesne University, Pittsburgh, PA

Abstract

The purpose of this research presentation is to identify the relationship between socioeconomic status and glycemic control in children and young adults living with Type 1 diabetes. Poor blood glucose regulation can often lead to various lasting complications such as chronic kidney disease, loss of eyesight, infection, and even death. These can be devastating to an individual, yet preventable. The complications resulting from the lack of strict glucose regulation are a significant problem currently facing healthcare and disproportionately affecting patients from lower socioeconomic groups. Using CINAHL, research studies about the relationship between type 1 diabetes control and socioeconomic status were analyzed to identify why low income is associated with poor diabetes outcomes, and how nurses and other healthcare workers can best assist at risk lower socioeconomic patients to minimize the negative effects of type 1 diabetes.

Keywords: type 1 diabetes, socioeconomic status, glycemic control, pediatric

Introduction

Type 1 diabetes is a chronic autoimmune disease typically diagnosed in pediatric patients. Type 1 diabetes is hallmarked by the pancreas' inability to produce insulin, in turn leading to altered levels of glucose in the bloodstream. Hyperglycemia and hypoglycemia are dangerous conditions associated with this disease that can lead to many health complications. Patients diagnosed with type 1 diabetes must maintain a costly treatment regimen to prevent these health complications. This regimen includes management of insulin via subcutaneous injections or insulin pumps, blood glucose monitoring through glucometers, and a modified diet and exercise plan. Treatment efficacy is assessed through frequent endocrinology office visits, physical assessments, consults with a dietitian, blood work, and hemoglobin A1c blood tests. Without this specific treatment regimen, patients with type 1 diabetes can experience dangerous blood glucose levels leading to diabetic complications such as seizures, chronic kidney disease, diabetic retinopathy, coma, and even death. These complications can surface at any age but can be slowed or prevented with effective glycemic control beginning at diagnosis. Ineffective blood glucose management and related complications can disproportionately affect patients of lower socioeconomic status.

Literature Review

In a study by Thomas et al., (2018), 390 families, who had children diagnosed with with type 1 diabetes, were assessed to determine how lower socioeconomic status affected the family system and the patient's ability to successfully manage their disease. Family dynamics such as parenting style and parent involvement, parent-child conflict in diabetes management, and adherences to treatment regimen, along with demographics were assessed. Parents with chronically ill children experience extra challenges such as the ability to afford expensive medical supplies, like insulin, insulin pumps, and glucometer test strips, which are all essential supplies patients must have to manage their blood glucose levels with more precision. At the same time, these parents struggle with the ability to adapt their parenting styles to allow their child autonomy in their disease management while maintaining the safety of their child. This study found that authoritative parenting style, which was linked to better glycemic control, decreased in families

who were at lower income brackets. This type of health disparity can later manifest into a multitude of different health complications from their disease. (Thomas, et al., 2018).

Secrest et al., (2011) conducted a study of 658 adult cohorts, between the ages of 26 to 32, with type 1 diabetes and assessed the current state of their disease process. Participants of this study were followed from their disease onset and assessed around age 28. This research study analyzed income, level of education, and occupation to measure socioeconomic status, and cross analyzed current complications of diabetes in the participants. Educational level was self-reported and categorized as: no completion of high school, completion of high school, and higher-level education. A correlation between educational level and complications from diabetes was found to exist in individuals with lower educational background. These complications included end-stage renal disease, coronary artery disease, lower-extremity arterial disease, autonomic neuropathy, and proliferative retinopathy. This study not only found an increase in diabetic complications relating to socioeconomic status, but also found variations in health risks activities such as smoking and the presence of depression in the lower socioeconomic group (Secrest et al., 2011).

The correlation between food insecurity, which is a global public health issue, and diabetes management plays a large part in the ability to manage glycemic control as noted by Sutherland et al., (2020). In a prospective study, data was collected on 222 subjects over a period of 10-years from childhood into young adulthood. The information collected in this study suggested a well correlated relationship between food insecurity, lack of health insurance, and a lowered ability to successfully manage diabetes in contrast with their higher socioeconomic counterparts. The position of being underinsured, or lacking health insurance all together, added to the complexity of an already difficult disease by making the utilization of new, and expensive, advances in diabetes technology out of reach to many patients. This study explained how food insecurity can lead to hypoglycemia in people with diabetes due to inadequate or consistent nutritional intake. These factors led to an increased incidence of high-risk glycemic control in patients with type 1 diabetes from a low socioeconomic background (Sutherland et al., 2020).

Data Analysis

Data collected by Thomas et al., (2018) reviewed annual income brackets from less than \$20,000 to greater than \$150,000 by increments of \$10,000. The data noted that only 8.7 percent of children from families with an annual income of less than \$20,000 used insulin pumps compared to 41.8 percent of children with a yearly family income of \$150,00 and over. Adherence to diabetes management increased with that of family income. Similarly, hemoglobin A1c steadily decreased from 8.9 percent in the lowest income group to 8.1 percent in the highest income group, with an overall mean hemoglobin A1c of 8.4 percent. Parent-child relationships were also measured and compared to income and diabetes management (Thomas et al., 2018).

While using a student's t test, Secrest, et al., (2011) were able to demonstrate the physiological aspect of diabetes control. For example, the prevalence of end stage renal disease was 11.9 percent in the lowest socioeconomic status group compared to only 3.4 percent in the highest socioeconomic group. With coronary artery disease, the lowest socioeconomic status group had a 21.1 percent prevalence and the highest group had 12.1 percent. In the lowest group, 18.9 percent had lower extremity artery disease. In the highest socioeconomic group, only 5.4 percent were afflicted. In the lowest income group, 46.3 percent had autonomic neuropathy, while only 23.4 percent of the highest income group had it. Lastly, 42.9 percent of the lowest group had proliferative retinopathy compared to only 30.0 percent of the highest socioeconomic status group (Secrest, et al., 2011).

Sutherland et al., (2020) exhibited that patients from the higher socioeconomic group had a mean hemoglobin A1c of only 9.0 percent, while the lower socioeconomic group patients had a hemoglobin A1c mean of 9.7 percent. The rest of their data demonstrated a breakdown of prevalence of complications from diabetes in the groups. In the lower socioeconomic group, only 7.4 percent of patients achieved optimal glucose control, while the higher socioeconomic group had 15.5 percent of patients in optimal control. 61.1 percent of the lower socioeconomic group experienced high risk glucose control. Their counterparts in the higher socioeconomic group had a prevalence of high-risk glucose control of only 43.4 percent (Sutherland et al., 2020).

Results

The results of these three studies demonstrate that socioeconomic status, and perhaps education level greatly affects glycemic control in individuals with type 1 diabetes. The many factors associated with low socioeconomic status, such as food insecurity, lack of health insurance or being underinsured, and family dynamics all affect the management of chronic illnesses like type 1 diabetes. Patients from lower socioeconomic status families were less likely to utilize insulin pumps and adhere to their prescribed treatment regimen (Thomas et al., 2018). There were significant jumps in the percent of complications from diabetes in lower socioeconomic status compared to higher socioeconomic status patient groups. There were large and steady decreases of hemoglobin A1c levels in patients as the socioeconomic status increased. Optimal glucose control almost doubled in the study by Sutherland et al., (2020). The study by Secret et al., (2011) also found increased risky behaviors, like smoking, in lower socioeconomic groups that could affect health promotion. These studies provide support of the relationship between low socioeconomic status and negative health outcomes in children with type 1 diabetes.

Discussion

The issue of health disparities has become more markedly noted. The findings of these three studies shed light on a major health disparity issue facing healthcare today. Children from low socioeconomic status groups are predisposed to poor outcomes and major complications from their type 1 diabetes diagnosis. These patients had, on average, higher hemoglobin A1c levels, and a significantly higher prevalence of lasting complications. It is vital for healthcare workers to learn from this information and modify their plan of care to best fit their at-risk patients. Screening for the risk of this health disparity should become common practice in pediatric endocrinology offices in order to prevent complications before it is too late. It is important to screen for food insecurity and possibility for loss of insurance in every patient. Providers need to assess family dynamics and health literacy when it comes to diabetes education. Healthcare providers can then utilize different teaching plans based on the risk factors their patients face. Some adaptations in diabetes education for lower socioeconomic status patients could

include education from a dietitian on affordable diabetic diet and exercise regimen. Healthcare workers can explain and provide prescription discount cards and organizations that will help with the high cost of diabetes management. Information on support groups could also benefit the patients and families.

Adapting the patient's plan of care to fit their abilities will lead to better glycemic control and reduce the health disparity between the classes.

Limitations

This research is limited by only examining previous studies in journal articles, not creating a study firsthand. The studies referenced in this research used various sample sizes. To verify the findings of this research, a study should be created using large sample size which would also incorporate cohorts not just from city boundaries, but various geographical settings.

Conclusion

All three peer-reviewed research studies demonstrate that higher socioeconomic status correlated to better type 1 diabetes outcomes. These studies found that low socioeconomic status is associated with food insecurity, increased household stress, and lack of health insurance, all of which play a part in unsuccessful type 1 diabetes management. Low socioeconomic status predisposes a patient with type 1 diabetes to poor glycemic control and worse diabetes outcomes. This can lead to lifelong complications such as chronic kidney disease, eyesight issues, risk of infection, and even death. It is important, as healthcare workers, to understand the risk children with type 1 diabetes face. Knowing the increased risk of complications in children with low socioeconomic status, health care providers can adapt the client teaching and plans of care to attain best practices in patient outcomes. It is important for families living with children diagnosed with Type 1 diabetes, that healthcare providers understand and modify goals and education to meet the client and the family's needs to increase patient outcomes. It is imperative that further research studies continue to attain more rigorous healthcare guidelines for patients at risk of these healthcare disparities.

References

- Secrest, A. M., Costacou, T., Gutelius, B., Miller, R. G., Songer, T. J., Orchard, T. J., (2011). Associations between socioeconomic status and major complications in type 1 diabetes: The Pittsburgh epidemiology of diabetes complication (EDC) study. *Annals of Epidemiology*, 21, 374-381. doi: 10.1016/j.annepidem.2011.02.007
- Sutherland, M. W., Ma, X., Reboussin, B. A., Mendoza, J. A., Bell, B. A., Kahkoska, A. R., Sauder, K. A., Lawrence, J. M., Pihoker, C., Liese, A. D., (2020). Socioeconomic position is associated with glycemic control in youth and young adults with type 1 diabetes. *Pediatric Diabetes*, 21, 1412-1420. doi: 10.1111/pedi.13112
- Thomas, D. M., Lipsky, L. M., Liu, A., Nansel, T. R., (2018). Income relates to adherence in youth with type 1 diabetes through parenting constructs. *Journal of Developmental & Behavioral Pediatrics*, 39, 508-519. doi: 10.1097/DBP.0000000000000579