Gender Differences in Coronary Heart Disease Risk in Non-Diabetic Patients with Chronic Schizophrenia

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Schizophrenia[1]

- 1% prevalence
- Symptoms
  - Positive Symptoms
  - Negative Symptoms
  - Cognitive Deficits
- Subtypes
  - Paranoid
  - Disorganized
  - Catatonic
  - Undifferentiated

Symptoms and Social Functioning

Positive Symptoms
- Delusions
- Hallucinations
- Disorganized thoughts

Negative Symptoms
- Reduced emotional expressiveness
- Poverty of speech
- Loss of motivation
- Decreased activity
- Social withdrawal

Social/Occupational Dysfunction
- Work/School
- Interpersonal relationships
- Self-care/hygiene

Cognitive Deficits
- Attention
- Memory
- Poor insight

Comorbid Conditions
- Mood
- Substance abuse
- Anxiety
- Chronic medical conditions

Gender Differences in Schizophrenia[2]

- Lifetime risk is approximately equal
- Males have an earlier onset (18-25) and a poorer course of illness
- Females have a later onset (26-45) and a better course of illness up until menopause

Psychiatric Comorbidity

- Substance Abuse
  - Four times more likely to also have a substance abuse disorder[3]
- Depression and Suicide
  - Occurs in approximately 1/3 of patients with schziophrenia[4]
  - 10% of patients with schizophrenia commit suicide, while attempts occur up to 5 times that rate[5]
- Aggression and Violence
  - Patients tend to be more withdrawn and loners[6]
  - The presence of comorbid substance abuse, however, greatly increases the rate of violence[6]
- Obsessive Compulsive Behavior
  - Up to 15% of patients have comorbid obsessive compulsive disorder[7]

Medical Comorbidity

- Physical comorbidity accounts for 60% of premature deaths not related to suicide[8]
- Patients with schizophrenia have increased rates of several chronic medical conditions:
  - Coronary Heart Disease[9]
  - Chronic Obstructive Pulmonary Disease[10]
  - HIV[11]
  - Hepatitis C[12]
  - Diabetes Mellitus[13]

Schizophrenia and Coronary Heart Disease (CHD)

- Patients with schizophrenia have a two-fold risk of dying from CHD in comparison to the general population[14]
- Metabolic syndrome[15]
  - The presence of 3 or more of the following:
    - Elevated waist circumference
    - Elevated triglycerides
    - Reduced HDL (“good”) cholesterol
    - Elevated blood pressure
    - Elevated fasting glucose
- When patients with schizophrenia have major CHD events, they are significantly less likely to receive the standard of care received by the general population[16]

The Framingham Heart Study[17]

- The objective of the Framingham Heart Study was to identify the common factors that contribute to cardiovascular disease (CVD) by following its development over a long period of time in a large group of participants who had not yet developed overt symptoms of CVD or suffered a heart attack

The Framingham Algorithm[18]

- Framingham coronary prediction algorithm (1991) provides estimates of total CHD risk (risk of developing one of the following over the course of 10 years):
  - angina pectoris
  - myocardial infarction
  - coronary disease death
- Separate score sheets are used for men and women and the factors used to estimate risk include:
  - age, total cholesterol, HDL cholesterol, blood pressure, cigarette smoking, and diabetes mellitus
  - relative risk for CHD is estimated by comparison to low risk Framingham participants

The Present Study

To examine the gender differences in coronary heart disease risk in non-diabetic patients with chronic schizophrenia using the Framingham Heart Algorithm

Methods

- Data was collected as part of a larger study funded by NARSAD: The Mental Health Research Association and The Stanley Medical Research Institute
- This larger study examined the effects of atypical antipsychotic medication on glucose metabolism in patients with schizophrenia[19]
- Used baseline data for present analyses

Methods

- Participants
  - 104 enrolled
  - 86 included in present analyses
- Data
  - Nutritional Assessment
  - Frequently Sampled Intravenous Glucose Tolerance Test (IVGTT)
  - Fasting Laboratory Assays

Analyses

- Descriptive statistics on demographic variables
- Calculated the estimated 10 year CHD risk for each subject using the Framingham Algorithm
- Calculated the relative risk for each subject by dividing the subject's risk by low risk
  - Low risk was calculated for a man or woman of the same age, normal blood pressure, total cholesterol and HDL cholesterol, a non-smoker and is non diabetic
- One-way ANOVA analyses were conducted to examine the gender differences in 10 year CHD risk and relative risk
- Analyses conducted using SPSS 15.0

Sociodemographics

	FEMALE (N=22)	MALE (N=64)
Characteristic	**Mean (sd)**	**Mean (sd)**
Age	43.11 (10.33)	41.16 (10.57)
Age of Onset**	30.47 (9.52)	21.59 (8.76)
Body Mass Index	27.48 (4.23)	27.17 (5.32)
Blood Pressure *Systolic*, Diastolic*	117.45 (11.45), 75.77 (9.17)	126.55 (11.81), 78.96 (11.15)
Total Cholesterol	167.23 (41.05)	169.69 (37.42)
High-Density Lipoprotein**	47.00 (12.57)	36.21 (13.95)
Characteristic	**Percentage**	**Percentage**
Family History of Diabetes *Yes*	59.1%	64.1%
Race *Caucasian* *African American* *Other*	 70.4% 25.9% 3.7%	 77.9% 18.2% 3.9%
Smoking Status *Yes*	22.7%	68.8%

*p<.01
**p<.001

Gender Differences in 10-Year Risk of Developing CHD

	N	Mean	Standard Deviation	F	Sig.
Female	22	3.41	3.60	10.69	.002
Male	64	8.08	6.34		

Gender Differences in Relative Risk of CHD

	N	Mean	Standard Deviation	F	Sig.
Female	22	1.16	.62	11.283	.001
Male	64	1.99	1.11		

Conclusion / Limitations

- Preliminary evidence of the gender differences in CHD risk among patients with schizophrenia
- The better course of illness for women with schizophrenia could serve as a protective factor in terms of CHD
- Limitations
  - Cross-sectional study
  - The Framingham Heart population in which this algorithm was derived was almost all Caucasian
  - Diabetes is a particularly potent risk factor for women and CHD
    - The study sample included only patients who were non-diabetic

Implications for Future Research

- In general, people with schizophrenia have:
  - poorer overall cardiovascular health status
  - higher risk factors for cardiovascular disease
  - higher mortality rates from cardiovascular disease
- CHD is the leading cause of death for women
- A revised, gender specific CHD model should be devised to identify the unique risk factors that puts this patient population at increased risk for CHD
- Mental health care providers should perform physical health monitoring that typically occur in primary care settings for their patients who do not traditionally receive physical health monitoring

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References

- 1. National Institute of Mental Health. Schizophrenia. *www.nimh.nih.gov*
- 2. Goldstein JM. Gender differences in the course of schizophrenia. *The American Journal of Psychiatry.* 1988;145:684-689
- 3. Green AI, Zimmet SV, Strous RD, Schildkraut JJ. Clozapine for comorbid substance use disorder and schizophrenia: Do patients with schizophrenia have a reward-deficiency syndrome that can be ameliorated by clozapine? *Harv Rev Psychiatry.* 1999;6(6):287-296
- 4. Siris SG, Addington D, Azorin JM, Falloon IR, Gerlach J, Hirsch SR. Depression in schizophrenia: Recognition and management in the USA. *Schizophr Res.* 2001;47(2-3):185-197
- 5. Siris SG. Suicide and schizophrenia. *J Psychopharmacol.* 2001;15(2):127-135
- 6. U.S. Department of Health and Human Services, National Institutes of Health. Schizophrenia. *NIH Publication No. 06-3517 www.nih.gov*
- 7. Hwang MY, Morgan JE, Losconzcy MF. Clinical and neuropsychological profiles of obsessive-compulsive schizophrenia: A pilot study. *J Neuropsychiatry Clin Neurosci.* 2000;12(1):91-94
- 8. Lambert TJR, Velakoulis D, Pantelis C. Medical comorbidity in schizophrenia. *Medical Journal of Australia.* 2003;178(9 Suppl):S67-S70
- 9. Davidson M. Risk of cardiovascular disease and sudden death in schizophrenia. *Journal of Clinical Psychiatry. 2002;*63:5–11
- 10. Himelhoch S, Lehman A, Kreyenbuhl J, Daumit G, Brown C, Dixon L. Prevalence of chronic obstructive pulmonary disease among those with serious mental illness. *American Journal of Psychiatry*. 2004;161:2317–2319
- 11. Stoskopf CH, Kim YK, Glover SH. Dual diagnosis: HIV and mental illness, a population-based study. *Community Mental Health Journal.* 2001;37:469-479
- 12. Rosenberg SD, Swanson JW, Wolford GL, Osher FC, Swartz MS, Essock SM, Butterfield MI, Marsh BJ. Blood-borne infections and persons with mental illness: The five-site health and risk study of blood-borne infections among persons with severe mental illness. *Psychiatric Services*. 2003;54:827–835

References

- 13. Dixon L, Weiden P, Delahanty J, Goldberg R, Postrado L, Lucksted A, Lehman A. Prevalence and correlates of diabetes in national schizophrenia samples. *Schizophrenia Bulletin*. 2000;26:903–912
- 14. Brown S, Inskip H, Barraclough B. Causes of excess mortality of schizophrenia. *Br J Psychiatry.* 2000;177:212 -217
- 15. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). Executive summary of the third report of the National Cholesterol Education Program (NCEP). *JAMA*. 2001;285:2486-2497
- 16. Druss BG, Bradford DW, Rosenheck RA, Radford MJ, Krumholz HM. Mental disorders and use of cardiovascular procedures after myocardial infarction. *JAMA*. 2000;283:506-511
- 17. National Institutes of Health, National Heart, Lung, and Blood Institute, Framingham Heart Study. *www.nhlbi.nih.gov/about/framingham/*
- 18. Wilson PWF, D'Agostino RB, Levy D, Belanger AM, Silbershatz H, Kannel WB. Prediction of coronary heart disease using risk factor categories. *Circulation*. 1998;97:1837-1847
- 19. Henderson DC, Cagliero E, Copeland PM, Borba CP, Evins E, Hayden D, Weber MT, Anderson EJ, Allison DB, Daley TB, Schoenfeld D, Goff DC. Glucose metabolism in patients with schizophrenia treated with atypical antipsychotic agents: A frequently sampled intravenous glucose tolerance test and minimal model analysis. *Arch Gen Psychiatry.* 2005;62(1):19-28