Project Proposal

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1 Problem statement

Psoriasis is a complex chronic autoimmune skin disorder that is caused by the rapid buildup of skin cells on the skin's surface [1]. It develops inflammatory patches on skin that may cause itch and burn. Psoriasis affects millions of people around the world, including 7.5 million people in the United States [2]. Yet, patients with this chronic condition experience a great negative impact on their quality of life as well as the costs associated with lost productivity and work absenteeism [3]. Psoriasis is a multi-factorial disease of unknown origin, but there have been several studies in recent decades about comorbidities and risk factors that affect psoriasis patients. Individuals with psoriasis are known to experience higher rates of cardiovascular disease, heart attack, stroke, metabolic syndrome and depression [4].

Studies in the literature suggest that exogenous and endogenous risk factors commonly influencing psoriasis include stress, diabetes, alcohol use, smoking and obesity [5]. Our study strives to provide an estimate of the risk for psoriasis associated with potential risk factors. The study attempts to utilize multinomial logistic regression to model degrees of psoriasis according to the amount of affected skin.

2 Data description

Data is obtained from the National Health and Nutrition Examination Survey (NHANES) questionnaires. We focus specifically on 2011-2014 data files. NHANES is one of the health-related programs conducted by the Centers for Disease Control and Prevention (CDC) and National Center for Health Statistics (NCHS). A unique feature of this survey is the collection of health examination for a nationally representative sample of the resident, civilian non-institutionalized U.S. population [6]. The data are freely available on https://www.cdc.gov/nchs/nhanes/index.html

The data consists of 325 responses on four degrees of psoriasis that patients have experienced (1: little or no psoriasis, 2: only a few patches, 3: scattered patches, 4: extensive psoriasis). In addition, the data contains demographic information, including patients' sex, age, income, ethnicity, and their health information such as BMI, glucose level, smoking status, alcohol use, and type 2 diabetes as regressors. Age, BMI and glucose level are continuous and the others are categorical. Problems may arise from missing data and outliers.

3 Methods

The goal of the project is to evaluate the effect of predictors reflecting patients' information on the degree of psoriasis of the patients. The response variable can take 4 values, thus the data can be formulated with a multinomial regression model. Since the response is ordinal, a proportional odds model will be employed. Since there is a myriad of predictors, model selection will be conducted first and then a formal test for proportional odds model will be implemented. After building a multinomial model, we will do diagnostic analysis of the model.

Potential methodological difficulties may stem from missing data, reducing the representativeness of the sample. Furthermore, there may be issues associated with lack of fit.

References

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