Vitamin D and plain type: a study of male patients with schizophrenia

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Abstract. Schizophrenia is a heterogeneous disorder in which there is an interaction between genetic and environmental factors. Evidence related to vitamin D deficiency and schizophrenia is scarce. Because influenced by geographical location this can affect sun exposure to individuals living in the area because the source of vitamin D for humans is exposure to sunlight. For determining differences in serum levels of vitamin D based on residence in the highland and lowland male schizophrenic patients. This study was an analytical study, by RS Jiwa Prof. dr. M. Idrem, Medan, approach to see the comparison 60 samples (30 patients live in the Highland and Lowland). Sample inspection for serum vitamin D using ELFA method. The results showed median levels of vitamin D subjects living in highland Tanah Karo was 22.20 ng/mL with minimum-maximum levels of 19.3 - 34.5 ng/mL and in the lowland Pemko Medan vitamin D levels higher with median 27.95 ng/mL with the minimum-maximum level of vitamin D 20.4 - 42.6 ng/mL. Analysis using the Mann Whitney U test showed significant differences between the levels of vitamin D based on residence with a value of $p = 0.001$.

1. Introduction

Schizophrenia is in all societies and geographic regions, and incidence and prevalence are roughly the same across the world.[1] The prevalence of schizophrenia is widespread (> 10-fold) across geographic areas generally in high latitudes and cold climates. It proves that the role of vitamin D in the etiology of schizophrenia is because the production of vitamin D differs from every geographical region, i.e., from poor sun exposure, either from high latitudes, cold climates, born in winter or dark-skinned people.[2]

In the general population, vitamin D levels are higher in males than females, and this decrease is due to age. Vitamin D levels vary by season, increasing at the end of winter and early spring and a half in autumn this is due to amount of sun exposure.[3]

In 2004, McGrath determined that low prenatal vitamin D (especially during the third trimester) may be a risk factor for schizophrenia in offspring. In a laboratory study, brain development was in neonatal rats in which the mice were made deficient in vitamin D by removing vitamin D from the diet and eliminating UVB radiation from the lighting in the test chamber. Vitamin D deficiency changes the size and shape of the brain in neonates, growth factor expression, and cell proliferation. These data suggest that vitamin D deficiency can have effects on brain structure, such as ventricular enlargement, and cortical thinning. Several factors may also affect vitamin D status, including genetic factors, adiposity, and factors affecting skin synthesis such as skin and ethnic pigmentation, age, season and location of latitudes.[5,6,7] Several factors and risks of schizophrenia are birth, migration status and or
latitude-related latitudes associated with vitamin D deficiency. Miller’s hypothesis observes that the association may associate with the effects of ultraviolet (UVB) rays. Individuals living in more latitudinal settings tend to get less vitamin D substance than individuals living in lower latitudes, furthermore, at altitudes above 350, UVB light required to form vitamin D is not available during the winter.[6]

Studies by Lally and colleagues in 2016 in London examined the association of vitamin D levels with age, sex, ethnicity and season with a total of 324 participants, participants living in areas between latitude 52.80 N and latitude 51.40 N, with 280 participants live in urban areas and 44 participants in rural areas. In this study also used seasonal blood samples to represent sunlight irradiation, it is a factor that raises the effects of duration and intensity of sun exposure.[8]

There are some points stated in the studies by Dennis and friends in 2009 at Belmont. First, the prevalence rates vary widely about geographical differences, with uplands greater than ten times lower. Secondly, there is a tendency for increased schizophrenia prevalence with altitudinal altitudes, for example, the average prevalence tends to decrease in the area near the equator and increases in the Polar Regions. McGrath's study proposed that the prenatal period of vitamin D deficiency is an important etiologic factor in schizophrenia. McGrath notes that deficiencies are more common in the highlands, especially in winter. The prevalence of vitamin D deficiency increases with latitude and cold climate because sun exposure to the skin for UVB radiation in sunlight is the greatest natural source of vitamin D, and the reduced time and intensity of sunlight in the highlands makes it difficult for people to get enough vitamin D, especially again in winter. Of all study subjects, the correlation prevalence of latitude (r = 46) and low temperature (r = -60) were both significant (P < 0.001 in each case).[9]

2. Methods
This study is an observational study with analytic comparative numeric independent two group design with the cross sectional approach the comparison level Vitamin D between 60 subject schizophrenic male patients (30 subjects live in High land Tanah Karo) and (30 subjects live in Low land Pemko Medan) in RS Jiwa Prof. dr. M. Ildrem Medan, blood samples were taken for 3 ml serum vitamin D examination by private laboratory officer, blood sampling was taken by time and hours in the outpatient polyclinic (11.00 - 12.00) until the required number of subjects was fulfilled, they will be examined in a private laboratory for serum vitamin D levels. Vitamin serum levels are analyzed using the ELFA Enzyme Linked Fluorescent Assay method.

The sampling method is by consecutive sampling method. Before determining the total subject for each group, we made a preliminary study. The subject Male Schizophrenic Patients who meet the criteria of PPDGJI III, Aged 18 - 50 years, patients in the Acute phase of Treatment, Stay in Tanah Karo for at least one year, have ideal body weight (BMI = 18.5–24.99), willing to be the respondent and can be an interview. Schizophrenic patients are comorbidities of common medical illnesses, organic mental disorders or other psychiatric disorders, history of use of alcohol or other substances, PANSS EC values P4, P7, G4, G8 and G14> 4 were an exclusion. The result of vitamin D level will be interpreted when all the data is complete. First of all, we use the Shapiro-Wilk test to normalize the data, and if it normalizes the distribution then we will use T-Test independent to compare the baseline data.

3. Result and Discussion
This research included 60 subject that divided into two groups, 30 subject live in High Land Tanah Karo, and 30 subjects live in Low land Pemko Medan. Statistical tests were performed using SPSS.

| Table 1. Characteristic demographic according to the residence. |
|---------------------------------------------------------------|
| Demographic Characteristic | Residence | P      |
|                            | High Land | Low Land |
|                            | (n = 30)  | (n = 30) |
|                             |           |         |

2
Table 1 shows the demographic characteristics of the subject by residence. The highest number of 18-28-year-olds living in the highlands were 11 people (36.7%) and in lowland areas with 14 subjects (46.7%). Most subjects with high school education who live in the highlands as many as 19 people (63.3%) and in the lowlands with the same number of 19 people (63.3%). The majority of unemployed subjects living in the highlands were 16 (53.3%) and non-working subjects living in the lowlands of 19 (63.3%). And the majority of married subjects living in the highlands as many as 20 people (66.7%) and unmarried subjects lived in the lowlands as many as 16 people (53.3%). The majority of subjects living in the lowlands with mean PANSS scores were 88.53 and the standard deviation score was 3.85. From BMI measurement found higher mean value in lowland living subjects was 22.6, and the standard deviation was 1.33. Of these demographic characteristics did not show significant differences between the two highland and lowland dwellings seen from age, education level, occupation, marital status, PANSS score and BMI.

Table 2. Differences vitamin D levels by residence.

| Median (Minimum-Maximum) | P     |
|---------------------------|-------|
| High Land (n=30)          | 22.20 (19.3-34.5) | 0.001 |
| Low Land(n=30)            | 27.95 (20.4-42.6)  |

Mann-Whitney Test. Average rank of 22.75 highland residence; lowland 38.25

Table 2 shows this study indicate that the median value on the subject living in the highlands is 22.20 and the lowland living subjects are 27.95 while the minimum value in the subject group living in the highlands is 19.3ng/ml and the subject living in the lowlands is 20.4ng/ml. In the subject group living in the highlands, the maximum value was 34.5 ng/ml while for the lowland subject group it was 42.6 ng/ml. The results of the analysis using Mann Whitney U test showed that there were significant differences for vitamin D levels based on the subject's residence with $p=0.001$.

4. Conclusion

Vitamin D is higher in subjects who live in Low land Pemko Medan than subjects live in High land Tanah Karo because it is near the equator, North Sumatra Province is tropical climates. The height of the land surface of Sumatera Utara province is very varied, some areas are flat, only a few meters above sea level, temperate enough to reach 33°C, some hilly areas with a slope of a gentle, temperate and partly located at an altitude that the minimum temperature can reach 15°C. Geographical location can affect sun exposure to individuals living in the area. The main source of vitamin D for humans is exposure to sunlight. Thus, skin pigmentation or topical of sunscreens that absorb UVB as much as...
99% of skin capacity to produce vitamin D3. An increase in the sun's peak angle during the winter and early morning and early affords along with the path for UVB photons through an absorbing ozone layer.

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