Association of intellectual disability with demographic variables among the population of Lahore, Kasur, Jhang and Chunian, Punjab, Pakistan

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Abstract- Intellectual disability (ID) is a permanent condition caused by a neurodevelopmental abnormality that is diagnosed in childhood. ID is a disorder described by intellectual performance which is below average (IQ< 70). Based on IQ, ID is catagorized into different categories: mild, moderate, severe and profound. One of the highest documented incidence of intellectual disability (ID) among children worldwide is seen in Pakistan. Prevalence makes an estimate from 19.1/1000 for serious ID to 65/1000 for mild ID. A study was conducted from September 2023-September 2024 in which data was collected from different special education centers in Lahore, Kasur, Jhang, and Chunian, in Punjab, Pakistan. The questionnaires aimed to gather data on demographic variables like students' name age, gender, location, contact, and degree of intellectual disability (ID). The data collected was analyzed using SPSS. The sample data was found to be non-normally distributed therefore, non-parametric tests were used to analyze it. Results show that out of 350 patients, 64.3% were males and 35.7% were females. There were 30.3% (n=106), 60% (n=210), 8.3% (n=29), and 1.4% (n=5) of mild, moderate, severe, and profound ID cases, respectively. Also, Chunian and Jhang are the cities with the highest mean ranks 205.28 and 206.44, respectively, indicating higher degrees of impairment in these cities. Kasur (139.26) and Lahore (159.04) have lower mean ranks, indicating fewer significant disabilities. This study's primary goal is to educate those who have been identified as being at risk for ID, as well as their families, coworkers, and other people.

Keywords- Association, Demographic variables, Intellectual disability, Pakistan, Prevalence

I. INTRODUCTION

Intellectual disability is as a failure of cognitive development that occurs during the developmental stage. Failure to develop cognitively can also impact adaptive reasoning, resulting in deficiencies in function and disability[1]. The World Health Organization defines intellectual disability as a significantly reduced ability to learn and use new abilities and to understand new or complex information (impaired intelligence). This begins before the age of 18 and affects development for a long time since it impairs one's ability to cope on their own (poor social functioning)[2,3]. Depending on intelligence level, there are four categories of intellectual disability: mild (IQ score between 50 and 70), moderate (IQ score between 35 and 49), severe (20 to 34), and profound (IQ score under 20) [4]. There are numerous reasons of intellectual impairment, including chromosomal defects, genetic mutations, and environmental factors[5].

With slight regional variations, the estimated prevalence of this illness is 1% to 3% of the global population. Due to a lack of access to healthcare facilities and preventative measures, which increases the risk of ID due to environmental factors, this is more common in low-income countries[6]. According to a meta-analysis, 1.4% of Indians have ID[7]. Data from global health databases suggest that 240 million children globally have developmental disabilities, compared to 290 million children using statistical modeling techniques. This estimate is based on parent-reported functional problems[8]. According to data from the national census of 1988, the prevalence rate for the 2010 surveillance year was 2.5% of Pakistani population, with 55% of those affected living in Punjab. High endogamy is one of the primary causes of Pakistan's higher incidence rate of genetic illnesses (ARID, which affects 6.2/100 live births and 1.1/100 cases of severing ID)[9].

The purpose of the current study was to evaluate the prevalence rate and the relationship between ID and demographic factors. This study was performed during September 2023 to September 2024 and the data was collected from different special education centers of Lahore, Kasur, Chunian and Jhang, Punjab, Pakistan. The main objective of this study is to enlighten persons who are identified as being at risk for ID, including those who work with them, their families, and other individuals.

II. MATERIALS AND METHODS

II.1 Nature of Study

The study utilized data from special education centers in Lahore, Kasur, Jhang, and Chunian, Punjab, Pakistan. The Lahore College for Women University's Zoology Department provided institutional ethical clearance for the data collection (Report number: RERC/LCWU/Zoo/859).

II.2 Questionnaire Design and Data Collection

The questionnaires aimed to gather data on variables like students' name age, gender, location, contact, and degree of intellectual disability (ID) (mild, moderate, severe, and profound).

II.3 Statistical Analysis

The data collected was analyzed using the Statistical Package for Social Sciences (SPSS) version 21. The sample data was found to be non-normally distributed therefore, non-parametric tests were used for analysis. The Mann-Whitney Test was utilized to test the prevalence of ID between genders. The Kruskal-Wallis Test was utilized to check the prevalence of ID between cities. To check the relationship between ID and age groups, non-parametric Correlations were utilized. For checking the combined effect of gender, age, and address on the level of disability (ID), PLUM - Ordinal Regression was applied to see the differences. A P-value of <0.05 was viewed as significant. A P-value < 0.01 was regarded as extremely significant, whereas P-values >0.05 were interpreted as insignificant.

III. RESULTS

III.1 Distribution of variables

There were about 350 ID patients in total, of which 64.3% (n = 225) were males and 35.7% (n= 125) were females. Of the 350 cases, 38.3% (n=143) were from Lahore, 26.0% (n=91) from Jhang, 18% (n=66) from Chunian and 16.9% (n=59) were from Kasur. There were 30.3% (n=106), 60% (n=210), 8.3% (n=29), and 1.4% (n=5) of mild, moderate, severe, and profound ID cases, respectively. Ages 16 and older make up fewer than 5% of the sample, with the next age ranges having lower frequencies. Distributed by age the most common group in the sample was 6 to 10years making 28.3%(n=99), with 0 to 5 years, 10% (n=35), 11 to 15 years, 26.0%(n=91), 16 to 20 years, 21.7% (n=76)coming in close behind. These age groups cumulatively comprise 86% of the sample.

Table 1. Frequencies of Variables

Variable	Gender	Age (1-4)	Age (5 and above)	Level of Disability	Address
Category	Male (225, 64.3%)	1 (35, 10.0%)	5 (30, 8.6%)	Mild (106, 30.3%)	Chunian (66, 18.9%)
	Female (125, 35.7%)	2 (99, 28.3%)	6 (10, 2.9%)	Moderate (210, 60.0%)	Jhang (91, 26.0%)
		3 (91, 26.0%)	7 (7, 2.0%)	Severe (29, 8.3%)	Kasur (59, 16.9%)
		4 (76, 21.7%)	9 (1, 0.3%)	Profound (5, 1.4%)	Lahore (134, 38.3%)
			10 (1, 0.3%)		

Table 2. Descriptive Statistics of Variables

Variable	N	Mean	Std. Deviation
Gender	350	1.36	0.480
Age	350	3.11	1.434
Level of Disability	350	1.81	0.638
Address	350	2.75	1.156

III.2 Non-Parametric Tests

The analysis discovered major findings on the Prevalence and Association of Different Levels of Intellectual Disability. These findings are listed below individually.

Table 3 shows that males and females have non-significant differences in Intellectual disability which means they have similar levels of disability, according to the Mann-Whitney U test (p = 0.620). The effect size should be taken into consideration even if the test results indicate that there is no significant difference. Even in the rarest of circumstances, a change might have been negligible, according to the relatively low Z-score of -.495.

Table 3. Association of Intellectual Disability with Gender

Gender	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
1 (Male)	225	177.24	39,878.00				
2(Female)	125	172.38	21,547.00	13,672.000	21,547.000	-0.495	0.620
Total	350						

Table 4 shows a non-significant relationship between Intellectual disability and age according to Spearman's correlation (rho = 0.104, p = 0.052), revealing a weak positive association indicating that the level of disability is not impacted by age.

Table 4. Association of Intellectual Disability with Age

Variables	Correlation Coefficient	Sig. (2-tailed)	N
Level Of Disability ↔ Age	0.104	0.052	350
Age ↔ Level Of Disability	0.104	0.052	350

Table 5 shows a significant association between Intellectual disability and address according to A Kruskal-Wallis H test (p = 0.000), revealing that disability is more prevalent in Chunian and Jhang residents than in Lahore and Kasur residents.

Table 5. Association of Intellectual Disability with Address(cities)

Address	N	Mean Rank	Chi-Square	df	Asymp. Sig.
Chunian	66	205.28			
Jhang	91	201.64			
Kasur	59	139.26			
Lahore	134	159.04			
Total	350		30.312	3	.000

Chunian and Jhang are the cities with the highest mean ranks (205.28) and 206.44, respectively, indicating higher degrees of impairment in these cities. Kasur (139.26) and Lahore (159.04) have lower mean ranks, indicating fewer significant disabilities. The results of the Chi-Square test (30.312, p = 0.000) show that these variations are highly significant and that there are notable variances in the range of impairment levels among the cities.

According to the ordinal logistic regression model in table 6, Chunian (p = 0.001) and Jhang (p = 0.001) had higher probabilities of having significant disabilities than Lahore, confirming that address is a major predictor of disability severity. Gender and age did not significantly predict anything. Age and gender did not appear to have a major impact on impairment levels, although geographical regions did. The model accounted for 10.3% of the diversity in disability level.

Table 6. The combined effect of gender, age, and address on the level of disability (ID)

Variable	Estimate	Std. Error	Wald	Sig.	95% Confidence Interval
Thresholds					
Level of Disability = Mild	-0.508	0.283	3.217	0.073	[-1.063, 0.047]
Level of Disability = Moderate	2.790	0.337	68.671	0.000	[2.130, 3.450]
Level of Disability = Severe	4.802	0.535	80.463	0.000	[3.752, 5.851]
Location Variables					
Age	-0.049	0.095	0.265	0.607	[-0.235, 0.137]
Gender = Male (1)	0.148	0.234	0.403	0.526	[-0.309, 0.606]
Gender = Female (2)	0a	-	-	-	-
Address = Chunian (1)	1.147	0.337	11.571	0.001	[0.486, 1.808]
Address = Jhang (2)	1.106	0.345	10.303	0.001	[0.431, 1.782]
Address = Kasur (3)	-0.418	0.355	1.383	0.240	[-1.114, 0.278]
Address = Lahore (4)	0a	-	-	-	-

IV. DISCUSSION

Intellectual Disability (ID) is a neurodevelopmental disease that affects cognitive function and results in learning problems. It is characterized by low IQ, impairment in adaptive abilities, and disease start before the age of eighteen. It can be caused by both genetic and environmental factors [10]. The present research involve a statistical approach to study the prevalence of ID in Punjab, Pakistan. Data was collected from 350 ID patients. Among these, 64.3% were males and 35.7% were females. In this research, along with gender distribution, the severity of the disease has also been studied in which there were 30.3%, 60%, 8.3%, and 1.4% of mild, moderate, severe, and profound ID cases, respectively. In 2021, a similar research was conducted by Naz et al., in which 315 patients from Lahore, Gujranwala, Sialkot, Shahkot, Faisalabad and Sangla, Punjab, Pakistan were identified and prevalence was investigated. Among which 56.82% were males and 43.17% were females. Also, There were 46.7%, 32.1%, 14.6%, and 6.7% of cases of mild, moderate, severe, and profound ID, respectively [9)].

These results can also be compared to a study that was carried out in Lahore, Pakistan, where 50% of the participants were controls and 50% were affected. Of the people, 44% were females and 56% were males [11)]. These results suggest that the frequency of ID in males is higher than the frequency in females but in this study, according to the Mann-Whitney U test, males and females have non-significant differences in Intellectual disability which means they have similar levels of disability (Table 3).

Originating before the age of eighteen, intellectual disability (ID) is a major impairment in intellectual functioning and adaptive behavior [11]. In this study, the samples were distributed in different age groups to check the whether ID has any connections with age or not. Results show a non-significant relationship between intellectual disability and age according to Spearman's correlation (rho = 0.104, p = 0.052), indicating that the level of disability is not impacted by age (table 4).

Ninety cases were analyzed in a study that was carried out in Assiut, Egypt. Among these, 70% of reported cases were from rural areas and 24% were from urban areas. A statistically significant relationship was found between intellectual disability and the family's socioeconomic status as determined by where they lived. They found that incidences of mental retardation are more prevalent in rural regions and among men [12]. The present study also suggests somehow similar results as the frequency of ID is higher in males than in females. The data was collected from four different cites of Punjab, Pakistan for this study. A Kruskal-Wallis H test was done on the address and it revealed that disability is more prevalent in Chunian and Jhang residents than in Lahore and Kasur residents(table 5). So it can be concluded that the prevalence of ID had no impact on age and gender but it is significantly related to residence of patients. Other than inheritance, socioeconomic factors like residential area also play important role in occurrence of intellectual disability as people living in less developed areas have shown higher frequency of the disease.

V. CONCLUSION

This purpose of this study was to investigate the statistical relationship of intellectual disability with different demographic variables including gender, age and residential address. It revealed that Gender and age did not significantly predict anything. Age and gender did not appear to have a major impact on impairment levels, although geographical regions did. According to this study, ID is more common in males and factors like residential address can also play important role in occurrence of ID.

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