PREVALENCE OF PARKINSON'S DISEASE IN AL-KADHIYMIA DISTRICT (BAGHDAD CITY): COMMUNITY-BASED STUDY

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Abstract

Background: Parkinson's disease is a chronic neurodegerative disorder affects mostly people above 40ys. Studying its prevalence is crucial for health public planning especially as worldwide communities are getting older. There are some worldwide variations in the estimated prevalence rates and the figures are unknown in our country.

Objective: To estimate the prevalence of Parkinson's disease in Al-Kadhiymia district.

Methods: Community-based study was conducted as cross-sectional survey on random sample of the population of the district. Suspected cases of Parkinson's disease identified during home visits were referred to the neurological department at the University Hospital of Iraqi Medical College in order to confirm the diagnosis of the senior neurologist. Diagnosis is made by identifying at least two cardinal features of the disease (resting tremor, bradykinesia, rigidity and postural instability) in the absence of signs of secondary parkinsonism.

Results: 25 cases of Parkinson's disease collected from a random sample of 22,988 individuals (13 were males, 23 were females. 6 lived in rural areas and 19 in urban). Three cases (12%) were newly diagnosed. Tremor was the predominant symptom of onset (80%). 19 cases had bilateral involvement of the disease, in spite of the unilateral onset of all cases. The crude prevalence rate was 108.75 per 10^5 population. Age adjusted prevalence rates showed constant increase with age. Gender-adjusted prevalence rates were calculated for male $114/10^5$ populations and for $103/10^5$ population. Residency-adjusted prevalence rates were 114,3 and 94,3 per 10^5 population for urban and rural living respectively.

Conclusion: Prevalence rate of Parkinson's disease is just lower than the figures in Europe and North America, but higher than those of Africa and China. It increases constantly with increasing age. There was no significant gender or rural difference in the prevalence rates. The prevalence figure can be applied to the population of Baghdad City because of the similar population structure and characteristics to those of Al-Kadhimiya district.

Key words: Parkinson disease, prevalence, Baghdad, Cross sectional study

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Introduction

Parkinson's disease (PD) is a progressive neuro-degenerative disorder, which affects the movement or the control of movement including speech and "body language". Four cardinal signs dominate it: bradykinesia, tremor and rest, rigidity and postural instability. It mostly affects elderly people with overall prevalence of about 1.6 percent in persons over 65 years of age[1].

The disease is chronic and progressive. Its life expectancy increased since the introduction of L-dopa treatment. Other medical therapies and some resent surgical techniques providing continuous improvement of the disease disability[2].

In addition, the population of the world, in general, is growing older because of the improving health services. This gives an indication that PD will affect more people i.e incidence and prevalence of the disease will continue to rise[1]. These facts indicate that the importance of PD as a population health

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issue is expected to increase in the near future.

The prevalence of PD is studied worldwide with some variations in the figures[3-33]. In 1990 worldwide estimated 4 million people were suffering from PD, approximately one million of them in North America[1,2].

In Iraq, there is no local record about the prevalence of PD or the epidemiological factors that affect it. Therefore, we found that it was necessary to study this subject in order to identify the disease extent and to plan useful measures for health care institutions and personnel.

Patients and Methods

Area of the study

The area chosen for the study was Al-Kadhiymia district, one of the original regions in Baghdad City (Capital of Iraq). It is located north of Baghdad on the western bank of the Tigris River. The total population of Al-Kadhiymia district is 480686 people, according to the Iraqi population survey of 1997 distributed into 38 sectors in urban area and 16 villages in rural one. It was chosen because of:

1. Large number of its population,
2. Its inhabitants are of different social classes,
3. Containing both rural and urban areas,
4. Its proximity to the University Hospital.

All individuals involved in the study were asked to take part in it. Their consent was taken while visiting their families at home.

Sample of the study

A random sample was determined from the general population of the district as follows:

* For urban area: in each sector, 20% of the families were selected randomly and included in the study.
* For rural area: 20% of the families living in villages were randomly selected to be enrolled in the study.

The sample was about 23 000 individuals described as families in order to involve all age groups. The random sample was determined and designed in cooperation with the Central Statistical Organization authorities that provided us with a detailed account on the names, locations and numbers of the selected streets and sectors. These numbers were listed by local authorities, in marks at beginning and end of streets.

Survey

This is a community-based study, designed as a cross-sectional survey on the general population. A suitable questionnaire was designed *(see appendix)* in two parts so that the study was run in two phases:

* Phase 1 (screening phase): Families were interviewed at home. One of the researchers did the interviewing to explain the purpose of the study, ask questions about age and gender of each family member and the presence of any of the following:

1- Tremor of the hands "Is there any trembling movement of the hands?"
2- Bradykinesia "Is there any slowness of movement during walking?"
3- Previous diagnoses of PD "Is there any member who has the diagnoses of PD?"
4- Use of antiparkinsonian drugs "Is there any one who is taking L-lopa, Trihexyphenidyl or Bromocriptine tablets?"

Any member who had positive answer would be examined to demonstrate the parkinsonian signs. Patients excluded from further assessment if they had used anti parkinsonian drugs for other indications (e.g. Bromocriptine for pituitary adenoma or prophylactic treatment with anticholinergic drugs in association with dopamine antagonists in patients with psychotic disorder).

* Phase 2 (confirmatory phase): All suspected cases of PD were referred to the neurological department of the Al-Kadhimiya Teaching Hospital where history and neurological examination is performed by senior neurologist.

Patients with confirmed diagnosis of PD would be questioned about: the duration of their symptoms, type of onset, drug ingestion (neuroleptics, antidopaminergic), family history of PD or tremor, presence of medical illness, smoking, number of rooms, family members and total years of education (*see appendix*).

Diagnosis criteria

According to the WHO definition[1] PD was diagnosed when the patient had at least 2 of the cardinal signs (resting tremor, bradykinesia, rigidity and postural instability) with no signs of nervous system involvement, such as corticospinal deficit, cerebral dysfunction, conjugate down or lateral gaze impairment, or prominent early automatic nervous system involvement. Patients with drug induced Parkinsonism were excluded.

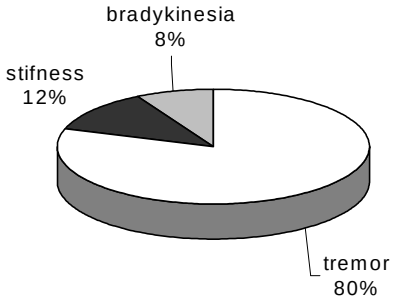

Figure 1: The distribution of onset symptoms in patients with Parkinson's disease

Statistical analysis

Our data was computed in Pentium III system using the statistical analysis system (SPSS version 10.0). We calculated the prevalence rates as crude and category specific (age, gender, and residency). The quantitative data were expressed as mean (X) standard deviation (SD). We determined whether differences in prevalence rates were statistically significant or not by student (t) test and chi-square (X^2) test. A probability limit (p value) of <0.05 was considered statistically significant.

Results

The cross-sectional survey started from December 1st 2000 till September 15th, 2001. The total population involved in this study was 22988 individuals, 11645 (50.7%) of them were females and 11334 (49.3%) were males. Individuals living in urban areas were 16646 (72.3%) and in rural ones were 6364 (27.7%). 76 individuals with suspected PD were referred to the Al-Kadhimiya Teaching Hospital, 55 (72.3%) of them responded and 21 did not.

Those who did not respond two of them had written certificate of diagnosis of PD by a senior neurologist, two were bedridden with full certificate of PD confirmed by the neurologist, and for the other a second visit was done for reassessment that revealed exclusion of diagnosis. A total number of 25 cases of PD were collected, 13 males (52%) and 12 females (48%). Three cases (12%) were not diagnosed yet by the time of the survey. Those who were referred but not diagnosed as

PD, they had benign essential tremor, dementia or cerebrovascular accident.

The crude prevalence rate of PD was **108.75 per 100 000** population. The results of category specific prevalence rates are as follows:

Age: Table 1 shows the age-specific prevalence rates for the total population of the study. The age is categorized a below 20 years and groups of 10 years age for those 20 years and above. The youngest case was 35 years of age and 94 years was the age of the oldest. The most prominent collection of cases was in the age group of 60-69 years, it contained nine cases representing 36% of the total.

Table-1: Age-specific prevalence rates of Parkinson's disease in Al-Kadhiymia district

Age group	Population	Prevalence per 10^5
<20	12585	0
20-29	3671	0
30-39	2852	35.06
40-49	1693	118.13
50-59	1026	487.33
60-69	699	1287.55
70-79	317	1892.74
>80	113	2068.97
Total	22988	108.75

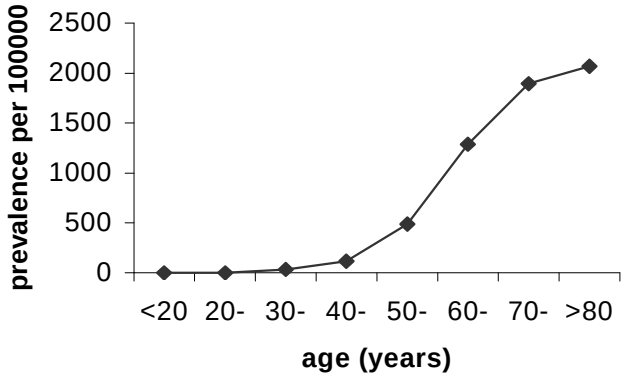

Figure 2: Correlation between prevalence rates of Parkinson's disease with age in Al-Kadhiymia

Gender: The prevalence rate of PD in men ($114.7/10^5$) was slightly higher than in women ($103.05/10^5$), as shown in table-2. This difference was statistically not significant ($X^2 = 0.07$, p=0.789).

Table-2: gender-specific prevalence rates of Parkinson's disease in Al-Kadhiymia district

Age group	Male			Female		
	Total	**PD**	**Prevalence per 10^5**	**Total**	**PD**	**Prevalence per 10^5**
<20	6161	0	0	6424	0	0
20-29	1821	0	0	1850	0	0
30-39	1407	1	0	1445	1	69.2
40-49	865	0	115.61	828	1	120.77
50-59	551	4	725.95	475	1	210.53
60-69	315	3	952.38	384	6	1562.5
70-79	150	3	2000	167	3	1769.4
>80	64	2	3125	81	0	0
Total	11334	13	114.7	11645	12	103.05

Residency: Table-3 shows the distribution of cases of PD among rural and urban areas. Ninteen cases were living in urban areas (10 males, 9 females) and six cases in rural one (three males, 3 females). There was slight increase in prevalence rate of PD in urban ($114.29/10^5$) more than in rural ($94.28/10^5$). This difference was of no statistical significance (p=0.68).

Table 3: residency-specific prevalence rates of Parkinson's disease in Al-Kadhiymia district

Area	**Cases**	**Total**	**Prevalence per 10^5**	**Significance**
Urban	19 (76%)	16624 (72.3%)	114.29	$X^2 = 0.17$ P = 0.68
Rural	6 (24%)	6364 (27.7%)	94.28	
Total	25	22988	108.75	

Onset: The predominant symptom of onset was tremor, which was present in 20 cases (80%), stiffness of the back was the initial symptom in three cases (12%) while bradykinesia was in two cases (8%), as shown in figure-2. All cases had a unilateral onset.

Laterality: The disease was unilateral in six cases (24%), and bilateral in 19 cases (76%). The average duration of the illness in unilateral disease was about half that of bilateral one. This is shown in table-4.

Table 4: The relation between average duration and laterality of illness in patients with Parkinson's disease

Laterality	**cases**	**Duration (years)**	**significance**
Unilateral	6 (24%)	2.5±2.41	T = -1.57 P = 0.13
Bilateral	19 (76%)	4.42±2.68	
total	25	3.84±2.68	

Discussion

Studies on the prevalence of PD had been conducted in many parts of the world, for example: Australia, New Zealand, Japan, United States, United Kingdom and Iceland. These studies generally relied on record of providers of health services (mainly hospitals and medical practitioners) in the identification of cases. Such maneuvers exclude individuals who failed to seek medical attention for their PD symptoms, as well as those who were improperly diagnosed.

This study was a community-based one where the approach of case finding was to go into the community and screen for patients with PD at home. This approach is more accurate especially in our circumstances where medical records are improperly handled and seeking medical advice is incomplete because of ignorance of symptoms, socio-economic difficulties or disease disability.

This is the first community-based study for PD carried out in our country to estimate prevalence of PD.

We found the crude prevalence of PD in the study population was 108 per 100 000 population. This figure is slightly lower than those reported in Europe and North America: London (193)[1], Finland (166)[4], San Morino (152)[5] and Canada (244)[6]. However, it is much higher than African figures: Nigeria (10)[7], Libya (31)[8], as well as China (57)[9].

These differences may be attributed to a different genetic susceptibility in different race[10]. However, other factors should be considered. Different age structures where older age population is more in developed countries may contribute to the higher prevalence rates[11].

Morens et al [12] found that incidence rates were similar in Asian-American men and in white men. This may be explained by more complete ascertainment than the previous studies. Alternatively, it may reflect a real increase in disease frequency among nonwhite U.S. residents because of increased exposure to an environment factor.

Recent prevalence study on PD was conducted in Taiwan on people of similar ethnic group to Chinese. It revealed a prevalence rate similar to European figures, suggesting that environmental factors might be more important than racial factors in the pathogenesis of PD[13].

Age: There was a consistent and rapid increase in prevalence PD with increasing age, even in the highest age categories. It increases about 20 times from age group of forty to that of eighty. This finding was similar to other studies[4,11,13,33]. Three cases (12%) were identified below the age of 50, corresponding to WHO figure[1].

Although PD is intimately related to aging, it has been demonstrated that its underlying process is distinct from natural aging. There is a marked microglial reaction to neuronal damage in PD that is not seen in normal aging[36]. It may be explained by aging-related factors like chronic exposure to neurotoxicants.

Gender: Prevalence of PD regarding gender distribution is controversial. Some studies show higher prevalence rates in men than women[3,4,6,8,19,20,21,22,37]. Other studies[5,10,14,15,24] found equal gender prevalence. In our study, there was no significant gender difference in the prevalence rate.

Residency: Several studies[6,24-26] indicated that rural living is a significant risk factor for PD. As Gorell study[38] we found no association between rural living and PD. It's the individual characteristics of rural living like farming, use of well water and exposure to herbicides and insecticides are the factors associated with PS[24,25]. These factors need to be evaluated in a specific case-control study with larger sample size.

Characteristics of the disease: The onset symptom was predominately tremor 80%, while stiffness only 12%. This may be

explained, as both stiffness and slowness of movement are manifestations of getting older, so the patients were unaware of them.

Three cases were first diagnosed at the time of study representing 12% of total cases. This is agreed with the assumption of Shrag[3] that 10-20% of all community patients remain undiagnosed.

Conclusion

1- Prevalence of Parkinson's disease in Al-Kadhiymia district is 108.75 per 100 000 population. This figure is slightly lower than European and American figures but more than in Africa and China.

2- There were no significant gender or residency differences in the prevalence of Parkinson's disease.

3- The prevalence figure can be applied to the population of Baghdad City because of similar population structure and characteristics to those of Al-Kadhiymia district.

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