Parkinson’s Disease in the Gulf Countries: An Updated Review

Yassar Alamri¹⁻³  Michael MacAskill¹,³  Tim Anderson¹,³,⁴  Hani Benamer⁵,⁶

¹New Zealand Brain Research Institute, ²Canterbury District Health Board, ³Department of Medicine, University of Otago, and ⁴Department of Neurology, Christchurch Public Hospital, Christchurch, New Zealand; ⁵Neurology Department, New Cross Hospital, Wolverhampton, and ⁶Department of Neurology, Queen Elizabeth Neuroscience Centre, Birmingham, UK

Key Words
Epidemiology · Parkinson’s disease · LRRK2

Abstract

Introduction

The Arabian Gulf countries, or simply the Gulf countries, are 6 countries that make up most of the Arabian Peninsula: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates. Also known as countries of the Gulf Cooperation Council (GCC; [1]), they comprise a rapidly developing part of the world, with an estimated collective population of just under 49 million [2]. They share socioeconomic qualities, religious beliefs and demographic characteristics. With the help of globalization and oil discovery, there has been a relatively recent surge in these countries’ incomes, making them some of the wealthiest countries in the world (average gross national income per capita of $68,792 in 2012 [2]). For the most part, this has led to improvements in lifestyle overall, specifically in health care [3]. For example, the average life expectancy has increased from 71.2 years in 1990 to 76.2 years in 2012 [4]. Unlike the political unrest in some of the neighboring countries since the ‘2011 Arab Spring’, the situation in the GCC countries remains largely stable.

Parkinson’s disease (PD) is the second most common neurodegenerative disorder in the elderly, and the most commonly seen movement disorder in neurology clinics [5]. Likely due to methodological and sociodemographic differences and time since publication, reported prevalence rates of PD vary widely in the published literature. For example, PD prevalence was reported to be as low as 18 per 100,000 in a Chinese population [6] and as high as
65–125 per 100,000 among the Europeans [7]. A study from England in 1992 revealed a prevalence of 121 per 100,000 [8]. It is expected that PD incidence will further increase in the future, as there are far more people surviving beyond 65 years of age than in the past [9]. With the improved life expectancy in countries of the GCC, PD in the area is likely to mirror the increase observed elsewhere. This article aims to review data about PD in GCC countries (see table 1 for a summary).

### Genetic Studies

Arab families generally tend to be large units with a high rate of consanguineous marriages (up to 30% of all marriages in some populations [10]), thereby increasing the risk of genetic and familial disorders. Familial PD accounts for less than 10% of all cases of PD [11]. More than 13 loci and nine genes have been implicated in causing familial PD. With such a high rate of inter-marriages and several candidate genetic defects causing PD, one would expect a much higher rate of familial PD in these populations. However, only 2 reports (parkin and PINK1 defects) have been published from GCC countries, suggesting that more research on potential genetic causes of PD in the region should be undertaken.

Only a handful of studies have specifically investigated the prevalence of PD in Arabs who mostly have their origin in North African Arab countries. A genetic study of familial PD in Tunisia [12] identified autosomal dominant with incomplete penetrance and autosomal recessive modes of inheritance. It is striking that

### Table 1. Published studies on PD in countries of the GCC

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Year published</th>
<th>Study type</th>
<th>Study method</th>
<th>Number of PD cases</th>
<th>Mean age in years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al Rajeh et al. [16]</td>
<td>Saudi Arabia</td>
<td>1993</td>
<td>Epidemiological</td>
<td>Door-to-door survey of various neurological illnesses in 1989</td>
<td>Not provided</td>
<td>Not provided</td>
</tr>
<tr>
<td>Jones et al. [22]</td>
<td>Saudi Arabia</td>
<td>1998</td>
<td>Genetic</td>
<td>Gene sequencing study of members of a consanguineous Saudi family</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Chishti et al. [23]</td>
<td>Saudi Arabia</td>
<td>2006</td>
<td>Genetic</td>
<td>Gene sequencing study of members of 5 consanguineous Saudi families</td>
<td>4 individuals (sex was masked to protect confidentiality)</td>
<td>32 years</td>
</tr>
<tr>
<td>Al-Rajeh et al. [24]</td>
<td>Saudi Arabia</td>
<td>1993</td>
<td>Clinical</td>
<td>Retrospective analysis of outpatient records of patients from a single movement disorders hospital between 1985 and 1990</td>
<td>64</td>
<td>Not provided</td>
</tr>
<tr>
<td>Ogunniyi et al. [25]</td>
<td>Saudi Arabia</td>
<td>1998</td>
<td>Clinical</td>
<td>Prospective analysis of clinical records of dementia patients diagnosed in a single hospital between 1985 and 1996</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Hamad et al. [27]</td>
<td>Qatar</td>
<td>2004</td>
<td>Clinical</td>
<td>Retrospective analysis of clinical records of dementia patients diagnosed in a single hospital between 1997 and 2003</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>
causes of familial PD, such as \textit{LRRK2} G2019S, which are
very prevalent in North African Arabs, have not been
reported from GCC Arabs [13, 14]. This could be attrib-
uted to the ancestral differences between GCC Arabs
and North African Arabs, the latter community being
much more closely associated with Berber ancestry [13].
The absence of \textit{LRRK2} G2019S mutations in the Saudi
population studied by Al-Mubarak et al. [15] further
demonstrates the genetic distinction between GCC
Arabs and North African Arabs. These findings, how-
ever, do not prove the specificity of \textit{LRRK2} G2019S mu-
tations to North African Arabs, and are a reminder of
the need for further exploration of the role of the genet-
ics of PD in the GCC.

\section*{Epidemiological and Clinical Studies}

It is surprising that a solitary epidemiological study on
neurological disorders in such a populated region has
been published [16]. Of the few clinical studies, a number
of knowledge deficiencies still exist. For example, not one
study has stratified PD patients according to their cogni-
tive state upon presentation/screening. The association of
PD and cognitive decline may be of particular relevance
to Arab patients, given that North African carriers of
\textit{LRRK2} G2019S mutations were found to have higher rates
of depression, hallucination and sleep disorders [17].

While crude prevalence rates of idiopathic PD in Arab
countries are reported to be similar to the value of 27 per
100,000 in Saudi Arabia [16] in some studies, others have
reported considerably different rates. One study con-
ducted in 3 tertiary referral centers in Irbid, Jordan, re-
ported prevalence of 37.4 per 100,000 [18]; a second 1986
population Libyan study reported a prevalence rate of
31.4 per 100,000 [19]; and a third Tunisian study report-
ed a crude prevalence of 43 per 100,000 [20]. In contra-
distinction, Khedr et al. [21] found a PD prevalence of
557.4 per 100,000 in a recent cross-sectional survey of the
Egyptian district of Assiut, a rate much higher than the
rate previously observed in the Arab world. The authors
of that study highlighted that their study population was
rural, possibly explaining this difference, with the major-
ity of other studies comprising urban populations [18,
19, 21].

\section*{Conclusion}

Future interventions should focus on uniting efforts in
the region, and conducting well-designed incidence and
prevalence studies, as well as genetic analyses (e.g. iden-
tifying \textit{LRRK2} G2019S mutation in GCC Arabs). The
GCC countries are considered among the richer coun-
tries, which should make conducting nation-wide or even
international studies logistically easier than it is in many
other countries within the region. Such multinational re-
search can be organized by the existing GCC, or through
a collaboration of the Ministries of Health. This would,
hopefully, culminate in the training of Arab movement
disorders researchers and the introduction of more spe-
cialized research centers, as well as the implementation
of better health care policies and practices for the aging
community.

\section*{Disclosure Statement}

The authors report no financial disclosures or conflicts of
interest.

\printReferences

\end{document}


