In the past decade, many countries in Asia, in particularly in East Asia, are experiencing a progressive rise in the incidence and prevalence of inflammatory bowel disease (IBD). Improved physician awareness and diagnostic methods are unlikely to fully account for this rapid increase. This epidemiological shift is likely to relate to industrialization, westernization of lifestyles and changes in eating habits, as part of the socioeconomic development in Asia, although many of these putative environmental factors have not been formally investigated in Asian cohorts. Genetic factors for IBD differ between Asia and the West. NOD2/CARD15 mutation, repeatedly observed in the Caucasian populations, is not associated with Crohn’s disease in Asian populations. Familial clustering is generally uncommon in Asia but it is expected to increase as the IBD prevalence in this region rises. Ethnic-racial differences of IBD have been described and Indians appear to be most affected in South-East Asia. Clinical manifestation of IBD in Asia resembles the Western population in general, but with some differences, including higher prevalence of males and ileocolonic disease, lower disease severity, surgical rates and extraintestinal manifestations. These differences may relate to time factor, genetic background and environmental factors. This review summarises recent epidemiological data of IBD including environmental factors associated with the development of IBD in Asia. Future research focusing on studying the epidemiology of IBD in an area of rapidly increasing prevalence such as Asia will allow the opportunity to identify potential risk factors and provide a better understanding of the aetiology of disease in the Asian population. (Intest Res 2010;8:1-8)
many Asian countries who will need to address both health needs of patients and the social burden of these chronic diseases.10-13 The epidemiology and clinical characteristics of IBD in Asia has been recently reviewed in two comprehensive reviews,7,14 and consensus for the management of IBD from several counties in Asia has been published.15-18 In this paper, I have provided an update on the incidence and prevalence of IBD, and susceptibility genes identified to date in studies from Asia. Environmental factors that may play a role in the rising incidence of IBD in this region were reviewed. Clinical features and complications of IBD in Asia were compared with the West, and clinical challenges and future research questions were discussed.

**INCIDENCE AND PREVALENCE**

The incidence rates of CD and UC vary worldwide between 0.1 to 16 per 100,000 inhabitants and 0.5 to 24.5 per 100,000 inhabitants, respectively.19,20 IBD is more common in the Northern than the Southern part of the world, and it is more common among Caucasian compared with non-caucasian populations. The highest incidence rates have been recorded in North America and North and West Europe, while lower rates have been reported in South America, Africa and Asia.21 The incidence of IBD in Australia has recently been shown to equal to the highest in the world.22 Epidemiological studies in the West have shown that the increase in incidence of UC precedes the increase of incidence of CD by about 15 to 20 years.23-25

In Asia, several studies have indicated a rising trend of the incidence and prevalence of IBD although only few data are available on the true epidemiology of IBD in Asia.7 Studies reporting the incidence of IBD in Asia have been derived mostly from hospital based database in which confirmed cases of IBD were extrapolated to the area that the hospital serves with the population in that area used as a denominator. Japan is the only country in Asia that has a national IBD registry maintained by the Ministry of Health, Labour and Welfare. Data reporting time trend increase in the incidence of IBD in Asia are now available.26-29 In Japan, cumulative numbers of IBD patients has risen by three-fold. The estimated annual incidence of CD in Japan have increased from approximately 0.6 per 100,000 in 1986 to 1.2 per 100,000 population in 1998.30 In Hong Kong, there is a three-fold increase in the incidence of CD in Chinese patients from 0.3 per 100,000 in 1986 to 1 per

<table>
<thead>
<tr>
<th>Authors</th>
<th>Country</th>
<th>Years</th>
<th>Incidence (CD)</th>
<th>Prevalence (CD)</th>
<th>Incidence (UC)</th>
<th>Prevalence (UC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higashi et al. 198836</td>
<td>Japan</td>
<td>1984-1985</td>
<td></td>
<td>1.86</td>
<td>5.85</td>
<td>7.85</td>
</tr>
<tr>
<td>Yoshida et al. 199026</td>
<td>Japan</td>
<td>1990</td>
<td>0.01</td>
<td>5.85</td>
<td>0.08</td>
<td>5.5</td>
</tr>
<tr>
<td>Morita et al. 199537</td>
<td>Japan</td>
<td>1991</td>
<td>0.51</td>
<td>5.85</td>
<td>1.95</td>
<td>18.12</td>
</tr>
<tr>
<td>Yao et al. 200030</td>
<td>Japan</td>
<td>1998</td>
<td>1.2</td>
<td>5.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yang et al. 200527,38</td>
<td>South Korea</td>
<td>1986-1990</td>
<td>0.05</td>
<td>5.85</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1991-1995</td>
<td>5.85</td>
<td>0.87</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1996-2000</td>
<td>0.52</td>
<td>5.85</td>
<td>1.74</td>
<td>7.57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2001-2005</td>
<td>1.34</td>
<td>5.85</td>
<td>3.08</td>
<td>11.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.85</td>
<td></td>
<td>30.87</td>
</tr>
<tr>
<td>Sung et al. 199449</td>
<td>Hong Kong</td>
<td>1994</td>
<td>1.0</td>
<td></td>
<td></td>
<td>1.3</td>
</tr>
<tr>
<td>Leong et al. 200426</td>
<td>Hong Kong</td>
<td>1999-2001</td>
<td>1.2</td>
<td></td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>Lok et al. 200840</td>
<td>Hong Kong</td>
<td>1997</td>
<td>0.35</td>
<td></td>
<td></td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2001</td>
<td></td>
<td></td>
<td>0.85</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2006</td>
<td></td>
<td></td>
<td>0.40</td>
<td>7.0</td>
</tr>
<tr>
<td>Zheng et al. 200541</td>
<td>China</td>
<td>1950-2000</td>
<td>0.28</td>
<td></td>
<td></td>
<td>1.38</td>
</tr>
<tr>
<td>Lee et al. 200733</td>
<td>Singapore</td>
<td>1999</td>
<td></td>
<td></td>
<td>3.6</td>
<td>6.0</td>
</tr>
<tr>
<td>Thia et al. 200642</td>
<td>Singapore</td>
<td>2004</td>
<td></td>
<td></td>
<td></td>
<td>7.2</td>
</tr>
<tr>
<td>Sood et al. 200335</td>
<td>North India</td>
<td>1999-2000</td>
<td>6.02</td>
<td></td>
<td></td>
<td>44.3</td>
</tr>
<tr>
<td>Ninella et al. 201043</td>
<td>Sri Lanka</td>
<td>2007-2008</td>
<td>0.09</td>
<td>1.2</td>
<td>0.69</td>
<td>5.3</td>
</tr>
</tbody>
</table>

IBD, inflammatory bowel disease; CD, Crohn’s disease; UC, ulcerative colitis.
Changes in lifestyle in Asia during the last two decades have resulted in a more “westernized” standard way of living, with increased consumption of refined sugar, fatty acids, fast food, cereals and bread and reduced consumption of fruit, vegetables and fibres. With all of these aspects of westernization previously being associated with IBD, westernization of lifestyle could potentially explain the observed increases

Table 2. IBD Susceptibility Genes Associated with the Asian Population

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Associated with CD</th>
<th>Associated with UC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japanese</td>
<td>TNFSF15, CTLA-4</td>
<td>HLA-DRB1, HLA DR2</td>
</tr>
<tr>
<td>South Koreans</td>
<td>TNFSF15, IL-23R</td>
<td>HLA-DRB1, HLA DR2</td>
</tr>
<tr>
<td>Han Chinese</td>
<td>IL-23R, CTLA-4</td>
<td>MIP-1, IL-18, MICB</td>
</tr>
<tr>
<td>Indians</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malaysians</td>
<td>NOD2/CARD15</td>
<td></td>
</tr>
</tbody>
</table>

IBD, inflammatory bowel disease; CD, Crohn’s disease; UC, ulcerative colitis.
of incidence of UC and CD. In Japan, the increased intake of diary products and meat has paralleled the rising trend of UC, and a higher consumption of sweets and high fat diet has been associated with UC and CD.

Other more controversial risk factors such as tonsillectomy, perinatal infections, oral contraceptives, breastfeeding and vaccinations have been proposed as being associated with IBD, but these factors have not been studied in the Asian cohorts. The only factors that have been proven to be important environmental factors in both UC and CD in studies from the West are smoking and appendectomy. Small studies in East Asia however have not shown an association between smoking and CD. Conversely the protective effect of smoking on UC had been confirmed in studies from Japan and China. Consistent with Western data, case-control studies in Asia has demonstrated the protective effect of appendectomy in UC. Overall, Asian populations probably has genetic susceptibility, that when exposed to putative environmental factors will develop IBD. This predisposition appears to be stronger in certain racial groups.

**CLINICAL CHARACTERISTICS**

Clinical manifestation of IBD in Asia is relatively similar to that of the West although disease severity may be less in Asia. A few studies have reported differences in the clinical phenotypes and complications of IBD, including higher prevalence of ileocolonic involvement in CD, lower surgical rates, and a low frequency of primary sclerosing cholangitis among IBD patients in Asia. Differences in disease, severity and complications may relate to genetic background, environmental factors such as diet and intestinal flora, and the duration of disease. The peak age of disease onset in Asia is 20 to 50 years, and a second peak after 50 years old is less common in Asian patients. Combined small and large bowel involvement appears to be most common in East Asia. In South and West Asia, distribution of disease site is more variable. Extraintestinal manifestations are less common in Asian populations. Table 3 summarises the clinical features of IBD in Asian compared with the Western population.

**CURRENT CHALLENGES AND FUTURE DIRECTIONS**

Current major clinical challenge relates to the accurate diagnosis of IBD in countries with a high background prevalence of infections. The diagnosis of CD in geographical areas where tuberculosis is common poses a diagnostic challenge. Infections may mimic IBD, and can complicate the course of existing IBD. Limited availability of diagnostic tests in particularly radiological imaging may delay diagnosis. Screening for latent infections specifically for tuberculosis and

---

**Table 3. Clinical Features of IBD in Asia and the West**

<table>
<thead>
<tr>
<th>Clinical features</th>
<th>Asian IBD populations compared with Western populations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender distribution</td>
<td>West: Female predominance for CD (26-30)</td>
</tr>
<tr>
<td></td>
<td>Asia: Slight male predominance for UC and CD (26-30)</td>
</tr>
<tr>
<td></td>
<td>West: 20–30 years old for CD and 30–40 years old for UC</td>
</tr>
<tr>
<td></td>
<td>Asia: Similar to the West but smaller second peak for CD and UC</td>
</tr>
<tr>
<td>UC distribution and severity</td>
<td>Asia: Proportion of extensive and pancolitis (18–46%) relatively similar to the West but milder disease course</td>
</tr>
<tr>
<td>CD distribution &amp; behaviour</td>
<td>Asia: Mostly resemble the West except ileocolonic predominant in East Asia</td>
</tr>
<tr>
<td>Extraintestinal disease</td>
<td>West: 21 to 41%</td>
</tr>
<tr>
<td></td>
<td>Asia: 6 to 14%</td>
</tr>
<tr>
<td></td>
<td>Primary sclerosing cholangitis (&lt; 1%) rare in Asia</td>
</tr>
<tr>
<td>Colorectal cancer in UC</td>
<td>West: 3 to 5%</td>
</tr>
<tr>
<td></td>
<td>Asia: 0 to 1.8%</td>
</tr>
<tr>
<td>Colectomy rates</td>
<td>Variable in Asia</td>
</tr>
</tbody>
</table>

IBD, inflammatory bowel disease; CD, Crohn’s disease; UC, ulcerative colitis.
hepatitis B deserve special consideration in Asia given the high prevalence of these diseases in the Asian populations. Recently biological therapy has entered the armamentarium of IBD, and the efficacy and side effects of biologics in Asian cohorts warrant further investigations. There is also a diverse medical practice in South Asia and South East Asia which include alternative and complementary medicine, Ayurveda, Homeopathy, and some patients with IBD may prefer to present to traditional and alternative health practitioners.

With the exception of Japan, Asia currently lacks population based registries of IBD. Contraints in health care resources have made the conduct of an epidemiological study in developing countries a challenge. Larger epidemiological data over time are necessary to describe the true incidence of IBD and further characterize the clinical features and risk factors of IBD in different geographical areas in the Asia-Pacific region. The conduct of an epidemiology study in Asia requires good case ascertainment in a well defined area with known denominator. Such studies will better define the burden of illness, explore the mechanism of association with environmental factors as well as identify new risk factors. Future studies to determine whether smoking plays a lesser role in the development of CD in Asian populations are needed. Studying exposure and risk factors for IBD require prospectively collected data from questionnaires on diet and environmental exposure in order to minimise recall bias and incomplete data. A large scale web-based epidemiology study (EpiCOM) organised by the European Crohn’s and Colitis Organisation (ECCO) is currently in progress in East and West Europe. A second project known as the Origin study, also conducted by ECCO, aims to prospectively recruit first degree relatives of probands with CD and follow them for at least ten years to assess the genotype, gut microbiota, immune function biomarkers and environmental exposures of subjects at risk of developing IBD.

Most genetic variants associated with IBD identified in Asia so far, through fine-mapping and candidate gene approach, vary according to ethnicity and nationalities. There is a lack of Genome wide association studies in Asia, and to identify novel Asian IBD-associated genes, such a study will require collaborative efforts between various centres in Asia in order to collect large number of samples. If the genetic and clinical heterogeneity of IBD in Asia is different from Western populations, response to medical therapy may also be different in our patients.

IBD represents an important public health problem affecting both the patient’s education, working abilities, social life and quality of life. Apart from direct medical costs associated with hospitalisations and surgery, IBD is associated with substantial indirect costs related to activity impairment, especially since the onset of IBD typically occurs during adulthood. Little is also currently known of the cost of management of IBD in Asia. More likely than not, the incidence of IBD will continue to surge in Asia in the next decade. Effective research and development of IBD therapies will require network and collaboration between multiple centres in Asia. Although yet incorporated into practice in Asia, optimal patient management will need to move towards multi-disciplinary approach, including the active involvement of specialist dietitians, radiologist, surgeons, and in some tertiary IBD centres, IBD nurse specialist and psychologists. New systems and opportunities for education in IBD should be incorporated into training of specialists.

**CONCLUSION**

The rising incidence of IBD in Asia in the last two decades is a real phenomenon, which is considered to be the result of environmental changes secondary to economic growth and affluence. There appears to be variation in the incidence, prevalence and disease characteristics between Asians of different nationalities and geography. Well conducted epidemiological studies of IBD will not only inform health care policy of the true scale of the disease in Asia but also offer the opportunity to help clinicians and researchers elucidate the role of environmental factors and identify new aetiological factors responsible for this “IBD epidemic” in Asia.

**REFERENCES**

1. Danese S, Fiocchi C. Etiopathogenesis of inflammatory bowel


