The Emerging Epidemic of Inflammatory Bowel Disease in Asia and Iran by 2035: A Modeling Study

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Abstract

Background: The projection studies are imperative to optimize the future need for health care systems and proper response to the public health problems such as inflammatory bowel disease (IBD).

Methods: To accomplish this, we established an illness-death model based on available data to project the future prevalence of IBD in Asia regions and Iran separately from 2017 to 2035. We applied two deterministic and stochastic approaches.

Results: For 2035 compared to 2020, we projected a 2.5-fold increase in prevalent cases for Iran with 69 thousand cases, a 2.3-fold increment for North Africa and the Middle East with 220 thousand cases, quadrupling of the prevalence for India with 2.2 million cases, a 1.5-fold increment for East Asia region with 4.5 million cases and a 1.6-fold increase in prevalence for High-income Asia-Pacific and Southeast Asia regions with 183 and 199 thousand cases respectively.

Conclusions: Our results showed an emerging epidemic for the prevalence of IBD in Asia regions or/and countries. Hence, we suggest the need for emergency action to control this increasing trend in Asia and Iran.

Introduction

IBD is one of the more expensive chronic diseases even more expensive than diabetes, coronary artery disease, and so on[1] that impose numerous problems on patients and the community. Because IBD has a complex and unpredictable natural history for both its subtypes, Crohn Disease (CD) and Ulcerative Colitis (UC). The increasing prevalence of IBD that is inherent from the non-fatal and incurable nature of the disease [2] and subsequent its increasing incidence of chronic disease, will worsen the problem.

Because, unlike some developed countries, we still are facing a markedly increase in the incidence of IBD in developing countries [3]. Therefore, it is crucial to implement actions in health settings that this problem can be addressed more effectively.

Therefore, we must provide the essential information to coping this problem and take evidence-based planning. In such a way, data on incidence, prevalence, mortality and morbidity of IBD in past, present and future are some essential components [4] for health policymakers to adopt clinical and management strategies[2] to tackle the effect of IBD. On another hand, the projection studies are imperative to optimize the future need for health care systems for diseases. Therefore, the proper response to the burden of IBD requires obtaining an accurate insight on the future prevalence of IBD.

Meanwhile, the projection of the future prevalence of IBD can provide opportunities to improve its management. Thus, we designed the current study to project the prevalence of IBD in the Asian and Iranian population by 2035.

Methods

Prerequisites data

In this modeling study, we used the illness-death model as demonstrated in other studies [5]. In this way, we first extracted the population size, fertility rate, number of new births and finally death rate due to IBD and due to other diseases for a different region of Asia and Iran separately from the Institute for Health Metrics and Evaluation (IHME) for the year 2017 [6, 7]. We also used two other pieces of evidence to extract the prevalence ratio and incidence rate of IBD for each region or country [8, 9]. Besides, we considered the reported IBD incidence rates in nine new articles according to the literature review that was not included in the previous study [10-19]. We adjusted the geographical classification for incidence rates with the IHME classification as shown below:

High-income Asia-Pacific region including Brunei, Japan, Singapore and South Korea (Fig1). **Central Asia including** Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan and Uzbekistan (Fig1). **East Asia including** China, North Korea and Taiwan (Fig1). **Southeast Asia including** Cambodia, Indonesia, Laos, Malaysia, Maldives, Mauritius, Myanmar, Philippines, Sri Lanka, Seychelles, Thailand, East Timor and Vietnam (Fig1). **North Africa and the Middle East including** Afghanistan, Algeria, Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Palestine, Oman, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, Turkey, United Arab Emirates and Yemen (Fig1). **South Asia including** Bangladesh, Bhutan, India, Nepal and Pakistan (Fig1).

We did not include the countries of Israel and Cyprus in our estimates because in the IHME classification they have been classified in the Western Europe region. We also did not consider the central Asia region because we could not find suitable information for the incidence rate of IBD in this region. We summarized the retrieved literature review data for Asia in Table1.

Modeling overview

We used two stochastic and deterministic dynamic models to project IBD prevalence in Asia. We first used a deterministic approach based on the ordinary differential equation to estimate the IBD prevalence as follow:

$$\frac{dHealth}{dt} = -((\text{Death rate} * \text{Health}) + (\text{Incidence rate} * \text{Health})) + \text{Birth number}$$
$$\frac{dIBD}{dt} = (\text{Incidence rate} * \text{Health}) - (\text{IBD death rate} * \text{IBD})$$

In this part, we used desolve and FME packages of R to solve equations and also perform sensitivity analysis.

For stochastic modeling, we constructed a one-dimensional Markov matrix (3*3) compromised of healthy people, IBD patients and death transition probability as follow:

$$I = \begin{matrix} & \begin{matrix} Health & IBD & Death \end{matrix} \\ \begin{matrix} Health \\ IBD \\ Death \end{matrix} & \begin{pmatrix} 1 - (\alpha_{12} + \alpha_{13}) & 1 - \exp(-Incidence\ rate / 100000) & 1 - \exp(-Death\ rate / 100000) \\ 0 & 1 - (\alpha_{23}) & 1 - \exp(-IBD\ death\ rate / 100000) \\ 0 & 0 & 1 \end{pmatrix} \end{matrix}$$

Then a Mote-Carlo stochastic based method was applied to solve we constructed matrix. We used ggplot2 R packages and QGIS3 to draw figures and maps respectively.

Results

Given the markedly public health effect of IBD in Asia, we designed this study to provide opportunities for policymakers to deal with IBD more efficiently. We observed an increasing trend in the prevalence of IBD from 2017 to now and from 2020 to 2035 in Iran (Fig1). So that, it shifted from 23 thousand cases in 2017 to about 30 thousand cases now and will be increased to about 69 thousand cases in 2035(Fig2 & Table2). Likewise, we observed a growing trend in the prevalence of IBD for North Africa and the Middle East region (Fig1). Such that, the prevalent IBD cases were shifted from about 166 thousand cases in 2017 to around 220 thousand cases in 2020 and will be expanded to around a half-million cases in 2035(Fig2 & Table2). We also observed an emerging prevalence for South Asia (India) and East Asia regions (Fig1). Hence, in India, the prevalence of IBD cases has changed from 212.451 thousand cases in 2017 to approximately 550 thousand cases in 2020 and will be raised around 2.2 million cases in 2035 (Fig3 & Table2). In the East Asia region prevalent cases have increased from 2.767 million cases in 2017 to around 3 million cases in 2020 and may increase to around 4.5 million cases in 2035(Fig3 & Table2). Likewise, we also observed an emerging prevalence for High-income Asia-Pacific and Southeast Asia regions (Fig1). In High-income Asia-Pacific the prevalence of IBD was shifted from 89.447 thousand cases in 2017 to around 105 thousand cases in 2020 and will be shifted to around 183 cases in 2035(Fig4 & Table2). In the Southeast Asia region, the IBD prevalent cases were increased from 103.884 thousand cases in 2017 to around 118 thousand cases in 2020 and will be extended to around 199 thousand cases in 2035(Fig4 & Table2). These results indicate that the Asian continent will face a rapid acceleration in the prevalence of IBD by 2035.

Discussion

Our results pave the way to optimize the future need for health care systems for IBD. In other words, policymakers will have opportunities to take suitable measures and implement interventions. We observed an emerging epidemic of IBD in Asia and Iran by 2035. In Iran we expect, the IBD prevalent cases will be increased 2.5 times (fold) from now until 2030. In North Africa and the Middle East, a 2.3-fold increment in prevalence is expected from 2020 to 2035. For India, the quadrupling of the prevalence from now to 2035 was projected. In the East Asia region, a 1.6-fold increase in the number of prevalent cases was estimated by 2035. In High-income Asia-Pacific and Southeast Asia regions around 1.7 times

increase in prevalence by 2035 was predicted. Our results emphasize the need for emergency action by the health policymakers in Asia and Iran to curb this increasing trend and subsequently emerging epidemic.

According to previously eminent evidence [20], most of the countries included in our study or/and classified by IHME in Asia regions have just experienced two phases of IBD evolution(stages) epidemiological by 2020, emergence and acceleration in incidence (shifting from sporadic cases to markedly increase in the number of new cases). In other words, in Asia, we will confront two additional stages in the evolution of the IBD, compounding prevalence and prevalence equilibrium (increment and drop down in prevalent cases). But the pace of IBD evolution in some Asian regions tends to be higher than in the Western world. So, the length of the struggle between incidence and death (stage 3) is expected to be shorter.

We estimated that the doubling of the prevalence period in Iran will be nearly 12 years, with 18,000 cases between 2020 and 2032. From now on, this timespan for North Africa and the Middle East appears to will be about 2031 to 2032 with 425-444 thousand cases of IBD. The time for doubling of prevalence in India is around 2025 with 1.11 million cases. For Iran, the Middle East, and India, the anticipated period is much shorter than that reported in the Western world at 20 to 25 years. By contrast, it appears like we will not see Southeast Asia, East Asia, and High-income Asia-Pacific doubling in prevalence by 2035. In other words, the number of cases in these areas will not reach 235 thousand cases, around 6 million cases and 209 thousand cases, respectively.

Hence, countries or regions of Asia are not homogeneous in terms of the epidemiological evolution of the disease. Therefore, despite the increasing prevalence of the IBD in different regions of Asia, there will be discrepancies in optimizing the potential needs of the health system for disease management. Which is beyond the scope of this article. However, apart from the capacity of the disease diagnostic system and the extent of access to healthcare, the obvious explanation may be related to the particular lifestyles of the inhabitants of those regions, that is a set of habits, relationships and beliefs.

One of the limitations of our research was that, despite an independent attempt for access to IBD incidence data in each region/country, the incidence of certain countries has been considered fixed for those countries since the publication of the last study. Another drawback of our work is that we do not take into account the model's potential variations in age and gender. Since age and gender differences were tangible in a related study in Canada[21]. However, we have not been able to use this information in the current model given the lack of access to suitable population-based information. The use of time-series models, on the other hand, often involves several years of disease information that was not present in our research. But the present research, as far as we know, is the first effort to explain the epidemiological future of IBD in Asia.

In light of the epidemiological transition theory preserving conventional dietary and behavioral patterns or in other words, the correct embrace of urbanized and westernized lifestyle is one of the crucial factors to curb this emerged epidemic. From this standpoint, in the following lines, we attempt to clarify the

strategies required by policymakers to provide an optimal platform for this adoption, because IBD is one of the modern lifestyle diseases. In 2016, these modern lifestyle diseases were responsible for around 71% of all deaths[22].

Contemplating that one of the rational alternatives of globalization or/and modernization is sustainable development[23] and that globalization and indices of sustainable development goals are relevant to each other[24]. We have sought to address our workaround within the context of the Sustainable Development Goals (SDGs)[22]. However, it is inevitable to accomplish these goals without taking into consideration the underlying characteristics of nations, populations, and communities. Therefore, we suggest that countries or/ and policymakers, design accurate and step-by-step field studies, attempt to include the imminent direction of modernity at the core of their culture. It helps to regulate the detrimental effects of modernity by not depriving society of its beneficial effects. In other words, since health encompasses not only the lack of diseases but also mental and social health, the lifestyles of people can be improved by closely examining the facilities and focusing on the communities' available resources.

Conclusions

Our findings can be used by policymakers to curb the growing trend of IBD in Asia. However, given that IBD is a lifestyle disease, though, the collaboration between multiple management agencies of a community and not only health policymakers seem necessary.

Abbreviations

IBD: inflammatory bowel disease, UC: ulcerative colitis, CD: Crohn's Disease, SP: stochastic process, DP: deterministic process, MM: markove matrix.

Declarations

Availability of data and materials

All the data used in this study is represented in Table 1.

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Conflict of interest

The authors have no conflicts of interest to declare for this study.

Consent to participate

Not applicable

Consent to publication

Not applicable

Ethics statements

This project has been ethically approved by the Ethics Committee in Gastroenterology and Liver Diseases Research Center, Research Institute for Gastroenterology and Liver Diseases, Shahid Beheshti University of Medical Sciences, Tehran, Iran. (NO. IR.SBMU.RCGLD.REC.1399.008).

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Author contributions

Conceptualization: MO, MRZ, MAP, SHN, ShSh, MI, PI, SKH, HAA, SS, SKh, ShBGh. Data curation: MO, HB. Formal analysis: MO, MAP, MI, PI, SHN, SS. Methodology: MO,

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References

1. Gunnarsson C, Chen J, Rizzo JA, Ladapo JA, Lofland JH: **Direct health care insurer and out-of-pocket expenditures of inflammatory bowel disease: evidence from a US national survey.** *Digestive diseases and sciences* 2012, **57**(12):3080-3091.
2. Coward S, Clement F, Benchimol EI, Bernstein CN, Avina-Zubieta JA, Bitton A, Carroll MW, Hazlewood G, Jacobson K, Jelinski S *et al*: **Past and Future Burden of Inflammatory Bowel Diseases Based on Modeling of Population-Based Data.** *Gastroenterology* 2019, **156**(5):1345-1353.e1344.
3. Ng SC, Shi HY, Hamidi N, Underwood FE, Tang W, Benchimol EI, Panaccione R, Ghosh S, Wu JCY, Chan FKL *et al*: **Worldwide incidence and prevalence of inflammatory bowel disease in the 21st century: a systematic review of population-based studies.** *Lancet (London, England)* 2018, **390**(10114):2769-2778.
4. Giampaoli S, Palmieri L, Capocaccia R, Pilotto L, Vanuzzo D: **Estimating population-based incidence and prevalence of major coronary events.** *International journal of epidemiology* 2001,

30(suppl_1):S5.

5. Brinks R, Hoyer A: **Illness-death model: statistical perspective and differential equations.** *Lifetime data analysis* 2018, **24**(4):743-754.
6. Vollset SE, Goren E, Yuan C-W, Cao J, Smith AE, Hsiao T, Bisignano C, Azhar GS, Castro E, Chalek J *et al*: **Fertility, mortality, migration, and population scenarios for 195 countries and territories from 2017 to 2100: a forecasting analysis for the Global Burden of Disease Study.** *The Lancet* 2020, **396**(10258):1285-1306.
7. Vos T, Lim SS, Abbafati C, Abbas KM, Abbasi M, Abbasifard M, Abbasi-Kangevari M, Abbastabar H, Abd-Allah F, Abdelalim A *et al*: **Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019.** *The Lancet* 2020, **396**(10258):1204-1222.
8. Alatab S, Sepanlou SG, Ikuta K, Vahedi H, Bisignano C, Safiri S, Sadeghi A, Nixon MR, Abdoli A, Abolhassani HJTlg *et al*: **The global, regional, and national burden of inflammatory bowel disease in 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017.** 2020, **5**(1):17-30.
9. Ng SC, Shi HY, Hamidi N, Underwood FE, Tang W, Benchimol EI, Panaccione R, Ghosh S, Wu JC, Chan FKJTL: **Worldwide incidence and prevalence of inflammatory bowel disease in the 21st century: a systematic review of population-based studies.** 2017, **390**(10114):2769-2778.
10. Ng SC, Kaplan GG, Tang W, Banerjee R, Adigopula B, Underwood FE, Tanyingoh D, Wei S-C, Lin W-C, Lin H-HJAJog: **Population density and risk of inflammatory bowel disease: a prospective population-based study in 13 countries or regions in Asia-Pacific.** 2019, **114**(1):107-115.
11. Ong HL, Idris FI, Telisinghe PU, Chong VH1: **Incidence and characteristics of inflammatory bowel disease in Brunei Darussalam.** *Brunei Int Med J* 2018(14):120-127.
12. Can G, Poşul E, Yılmaz B, Can H, Korkmaz U, Ermiş F, Kurt M, Dağlı ÜJTJkjoim: **Epidemiologic features of inflammatory bowel disease in Western Blacksea region of Turkey for the last 10 years: retrospective cohort study.** 2019, **34**(3):519.
13. Yen H-H, Weng M-T, Tung C-C, Wang Y-T, Chang YT, Chang C-H, Shieh M-J, Wong J-M, Wei S-CJIR: **Epidemiological trend in inflammatory bowel disease in Taiwan from 2001 to 2015: a nationwide populationbased study.** 2019, **17**(1):54.
14. Kwak MS, Cha JM, Lee HH, Choi YS, Seo SI, Ko KJ, Park DI, Kim SH, Kim TJJJog, hepatology: **Emerging trends of inflammatory bowel disease in South Korea: a nationwide population-based study.** 2019, **34**(6):1018-1026.
15. Okabayashi S, Kobayashi T, Hibi TJJotA, Rectum, Colon: **Inflammatory Bowel Disease in Japan-Is It Similar to or Different from Westerns?** 2020, **4**(1):1-13.
16. Esmat S, El Nady M, Elfekki M, Elsherif Y, Naga MJWjogW: **Epidemiological and clinical characteristics of inflammatory bowel diseases in Cairo, Egypt.** 2014, **20**(3):814.
17. Yang H, Li Y, Wu W, Sun Q, Zhang Y, Zhao W, Lv H, Xia Q, Hu P, Li HJPo: **The incidence of inflammatory bowel disease in Northern China: a prospective population-based study.** 2014,

9(7):e101296.

18. Abdulla M, Al Saeed M, Fardan RH, Alalwan HF, Almosawi ZSA, Almahroos AF, Al Qamish JJC, Gastroenterology E: **Inflammatory bowel disease in Bahrain: single-center experience**. 2017, **10**:133.
19. Malekzadeh MM, Vahedi H, Gohari K, Mehdipour P, Sepanlou SG, Ebrahimi Daryani N, Zali MR, Mansour-Ghanaei F, Safaripour A, Aghazadeh R *et al*: **Emerging Epidemic of Inflammatory Bowel Disease in a Middle Income Country: A Nation-wide Study from Iran**. 2016, **19**(1):0-0.
20. Kaplan GG, Windsor JWJNRG, Hepatology: **The four epidemiological stages in the global evolution of inflammatory bowel disease**. 2020:1-11.
21. Coward S, Clement F, Benchimol EI, Bernstein CN, Avina-Zubieta JA, Bitton A, Carroll MW, Hazlewood G, Jacobson K, Jelinski SJG: **Past and future burden of inflammatory bowel diseases based on modeling of population-based data**. 2019, **156**(5):1345-1353. e1344.
22. World Health O: **World health statistics 2018: monitoring health for the SDGs, sustainable development goals**. Geneva: World Health Organization; 2018.
23. Gawor L: **Globalization and its alternatives: antiglobalism, alterglobalism and the idea of sustainable development**. *Sustainable Development* 2008, **16**(2):126-134.
24. Tang S, Wang Z, Yang G, Tang W: **What Are the Implications of Globalization on Sustainability?—A Comprehensive Study**. 2020, **12**(8):3411.

Tables

Table 1: Literature review-based data that were used to populate the projection models				
Region(country)	Incidence rate	Prevalence(95%UI)	Death rate due to IBD (95% UI)	The death rate due to other causes(95%UI)
Iran	3.11	27.0(24.6- 29.6)	0.16(0.06-0.19)	463.97(452.58-477.04)
High-income Asia-Pacific	2.784	36.4(33.7- 39.3)	0.37(0.3-0.49)	931.03(921.89-940.28)
East Asia	1.541	134.6 (123.9- 145.6)	0.34(0.28-0.39)	752.33(661.03-848.26)
Southeast Asia	0.804	15.3 (13.9- 16.8)	0.22(0.17-0.26)	651.29(604-721.04)
North Africa and Middle East	3.121	29.6(26.2- 33.8)	0.17(0.14-0.2)	509.71(462.58-561.06)
South Asia (India)	8.133	16.2(14.7- 17.9)	0.3(0.21-0.4)	675.31(606.15-749.66)

Table 2: Prevalent IBD cases in Asia region(country) from 2017-2035					
Region(country)	2017	2020	2025	2030	2035
Iran					
Stochastic	23.812	30.475	43.505	56.177	69.166
Deterministic	23.812	31.445	43.955	56.207	68.207
High-income Asia-Pacific					
Stochastic	89.447	104.523	130.435	156.812	182.495
Deterministic	89.447	104.918	129.784	153.545	176.254
East Asia					
Stochastic	2.767	3.029	3.580	4.128	4.684
Deterministic	2.767	2.835	2.946	3.052	3.155
Southeast Asia					
Stochastic	103.884	117.154	142.512	169.552	199.35
Deterministic	103.884	119.716	145.481	170.490	194.766
North Africa and Middle East					
Stochastic	166.817	215.6	312.9	406.323	501.112
Deterministic	166.817	222.746	314.325	403.903	491.530
South Asia (India)					
Stochastic	212.451	550.156	1.115	1.685	2.244
Deterministic	212.451	549.418	1.097	1.627	2.142

Figures

Figure 1

Asia region (country) map Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. This map has been provided by the authors.

Figure 2

Prevalent IBD cases in Iran and North Africa and Middle East from 2017-2035

Figure 3

Prevalent IBD cases in South Asia and East Asia from 2017-2035

Figure 4

Prevalent IBD cases in Southeast Asia and High-income Asia-Pacific from 2017-2035