Bayesian Structural Time Series of Multiple Sclerosis Projection in Tehran, Iran

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Introduction

Multiple Sclerosis (MS) prevalence had been increasing worldwide and the highest prevalence ratio among Asian countries was reported in Iran (1-3).

Objectives

The aim of this study was to estimate the increasing of MS occurrence during more than three decades in Tehran and forecast the future condition of the disease using time series approach for the next ten years.

Methods

This cross-sectional study was conducted from 1989 to 2019 based on records of MS cases available at Iranian MS Society (IMSS) registry system. The prevalence was estimated using population data presented by the Statistical Center of Iran.

Bayesian Structural Time Series model (BSTS) was used by dividing subjects to familial and sporadic MS, assessing the development of disease concerning the short series of prevalence rates over the years.

Results

- Among 22421 cases with MS, 16831 (75.1%) were female and 5589 (24.9%) were male.
- Female to male ratio was 3:1 and Familial MS was found among 2982 (13.3%) of cases.
- Female gender was less responsible for higher rate of MS in familial definition (beta=0.020) in comparison to sporadic cases (beta=0.034) (Table 1).
- The prevalence rate for MS was estimated 220.84 (CI=171.48-266.92) for 2029, with sporadic MS 189.33(CI=146.97-230.19) and familial MS 30.79 (CI=24.16-37.15) respectively (Table 2 & Figure 1).

Data	Variable	Beta	SE	P-value
All	Female	0.249	0.029	<0.001
	Age	0.011	0.001	<0.001
	Familial	-1.919	0.110	<0.001
Sporadic	Female	0.034	0.007	<0.001
	Age	0.009	0.007	0.205
Familial	Female	0.020	0.001	<0.001
	Age	0.009	0.002	<0.001

Table 1. The results of BSTS model for assessing the development of MS

Year	Total MS	Familial MS	Sporadic MS
2020	189.50(183.94-195.14)	25.69(24.97–26.45)	163.74(159.06-168.57)
2021	193.00(184.6-201.28)	26.26(25.18–27.39)	166.6(159.61-173.82)
2022	196.50(184.42-208.02)	26.83(25.23–28.35)	169.45(159.15-179.16)
2023	199.97(183.79-215.27)	27.4(25.24–29.49)	172.32(158.38-185.68)
2024	203.45(182.7-222.98)	27.96(25.17–30.61)	175.11(157.29-192.05)
2025	206.93(181.19-231.26)	28.53(25.1-31.83)	177.96(155.73-199.19)
2026	210.41(179.31-239.54)	29.09(24.92–33.11)	180.82(154.02–206.5)
2027	213.87(176.92-248.41)	29.66(24.72–34.46)	183.63(151.76-214.43)
2028	217.36(174.36–257.50)	30.23(24.47–35.72)	186.51(149.58-221.73)
2029	220.84(171.48-266.92)	30.79(24.16–37.15)	189.33(146.97-230.19)

Table 2. Forecasting the prevalence (95 % confidence interval) of MS from 2020 to 2029 (prevalence in 100,000 population)
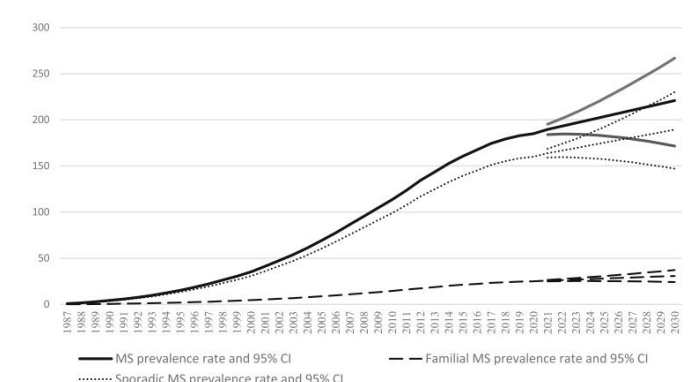

Figure 1. The prevalence of MS from 1987 to 2019 and forecasting tor the next 10 years (prevalence in 100,000 population)

Conclusions

MS prevalence has increased during the last three decades in Tehran and it is still increasing in the next ten years. Tehran is one of the regions with the highest MS prevalence in Asia. Furthermore, the results of the current study indicated that females have a higher risk of MS than males in both sporadic and familial types.

References

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