

AIM Migraine is a worldwide-common disease with a high prevalence and incidence, impairing the quality of life and workforce of the individual. Moreover, it creates an important economic burden for society. The prevalence of migraine in Turkey is considered to be 16.4% and estimated number of migraine patients is approximately 13,119,198. Our aim is to estimate the economic burden of migraine.

METHOD For determining the migraine economic burden, Cost of Illness methodology is used. After calculating direct and indirect costs, weight in frequency, determining the annual costs per patient, total cost is reached on the basis of the indicated prevalence. An expert panel has been organized for the use of health resources. Data obtained from our country's epidemiological studies as well as clinical literature, guidelines and expert opinions were used. The data have been validated by experts. For the direct costs, patients' applications to hospital yearly, laboratory and imaging tests implemented during admission, hospitalizations and treatments, medicine costs, side effects and complications are evaluated. Direct costs are calculated annually from a reimbursement agency perspective, taking into account the resource usage, frequency and usage rates. Indirect costs that belong to patient such as productivity loss are also calculated. Patients' absenteeism due to illness, sickness report and absenteeism due to treatment as well as transportation costs and out-of-pocket payments were also calculated under indirect costs. Data for indirect costs were obtained from literature specific for Turkey, while the missing data were obtained from expert panel. Dollar was used as currency (1\$ = 6,86 TL).

RESULTS It was calculated by the expert panel based on the experience and available literature that 100% of the patients visit neurology clinics at least four times per annum while the 40% visit the internal diseases once, 6% visit gynecology and obstetrics once, 5% visit psychiatry once, 1.3% visit eye diseases, 6% visit otorhinolaryngology, 10% visit neurosurgery two times, 26% visit family physician once and 50% visit emergency outpatient clinic per year.

As laboratory and imaging tests, brain MR (80%), brain MR angiography (15%), ECG (25%), transthoracic echocardiography (2%), cranial CT (75%), Doppler (1%), CSF (% 2), MR-venography (5%) and routine blood tests are required from patients. Only 1% of patients who do not respond to treatment are hospitalized for 5 days. Nerve blockades are applied to 3% of patients.

As stated in the treatment protocols, analgesics, beta blockers, antiepileptics, antidepressants, antiemetics, triptan, ergotamine are used in treatment. Annual usage rates were obtained from the expert panel (Table 1). In migraine patients, co-morbid diseases are included in the costs.

These diseases; depression (55%), anxiety (15%), panic disorder (2%), bipolar disorder (3%), epilepsy (3%), vertigo (30%), atopy (10%), sinusitis (1%), tremor (3%), conjunctivitis (1%), fibromyalgia (5%), sleep disturbances (10%), restless leg syndrome (4%), were reflected in the calculations by their incidences. In addition, the side effects of the drugs used, nausea (17.5%), hypertension (3%), bradycardia (1%), asthma attack (0.9%), kidney stones (0.5%), stomach bleeding (%0.1) were costed and direct disease cost per patient was determined on an annual basis.

Table 1 Drug Treatment by Usage Rates in Turkey

Active Ingredient	%	Active Ingredient	%
ASA	7.50	Ketoprofen	10.00
Paracetamol	55.00	Ketorolac	5.00
Diclofenac	35.00	Metamizole	10.00
Flurbiprofen	35.00	Naproxen	25.00
Ibuprofen	10.00	ASA or acetaminophen+ caffeine	12.50
TRIPTANS		ASA or acetaminophen + codeine combined compounds	2.00
Eletriptan	55.00	ANTIDEPRESSANTS	
Frovatriptan	30.00	Amitriptyline	2.00
Sumatriptan	15.00	Fluoxetine	1.50
ERGOTAMINE		Duloxetine	1.00
Ergotamine+caffeine	10.00	Escitalopram	1.50
ANTIEMETICS		Paroxetine	1.50
Domperidone	1.00	Sertraline	1.50
Metoclopramide	2.00	Venlafaxine	1.00
BETA BLOCKERS		Proton pump inhibitors	100
Propranolol	1.00		

Accordingly, the average outpatient and test cost per patient per year is \$ 116.85, the drug and side effect cost is \$ 235.24, the comorbid disease cost is \$ 94.5, and the average annual direct medical cost per patient is \$ 446.58.

Table 2 Annual Direct Non-Medical Costs and Indirect Cost Per Patient

Direct Non-Medical Costs (Average per patient / Yearly)	\$
Out-of-pocket Healthcare Expense	6.79
Transportation	22.74
Indirect Costs (Annual) (Average per patient)	\$
working days lost due to leave and report	143.43

Considering total number of migraine patients as 13,119,198 and half of them get diagnosed, total direct cost is determined as \$3,123,136,207.27 from the payer perspective.

According to the expert panel opinion, approximately 34.0% of patients got sick days report as 30 days in a year, all patients lost their work times for treatment in hospital as 8 days in a year and 7.5% traveled to other cities for treatment. In order to calculate production losses, the official minimum income for 2020 was accepted as the base wage. The total cost of working days lost due to leave and report is \$ 18,127,807 and an average of \$ 143.43 per patient (Table2). Total direct and indirect cost is \$619.55.

- Hence, total indirect is calculated as \$940,849,778.60 resulting in a total migraine cost for Turkey as \$4,063,985,985.88 including direct costs (Table3).

Table 3 The Economic Burden of Disease Annually

Total treated patient size	6,559,599
Total Direct cost of patient / per year	\$3,123,136,207.27
Total Indirect cost of patient/per year	\$940,849,778.60
Total economic burden of disease annually	\$ 4,063,985,985.88

CONCLUSIONS

Migraine is an important economic burden for Turkey. These data demonstrate the importance of the individual and societal impact of migraine and illustrate the need for improved strategies to target effective migraine treatment.