Burden of allergic rhinitis in Italy: findings of the ARTE** study

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ABSTRACT

Background: *Patients with allergic rhinitis experience both physical discomfort and detrimental effects on the psychological and social aspects of their own lives that involve direct and indirect costs.*
Aim of the study: *An economic analysis was conducted to evaluate the cost of allergic rhinitis from society's point of view, estimating resource consumption and loss of productivity. Costs for pharmacological treatment, specific immunotherapy, diagnostic tests, medical visits, rhinoplasty, Patients' and Caregivers' loss of production were also evaluated.*
Methods: *Two hundred eighty-one Specialists (allergists, dermatologists, paediatricians, ENT Specialists and pneumologists) recruited 5558 Patients. Data are aggregated according the type of allergic rhinitis (Seasonal Allergic Rhinitis - SAR, Perennial Allergic Rhinitis - PAR, or SAR plus PAR), and disease severity (expressed as rhinitis alone, rhinitis+asthma, rhinitis+other disease).*
Results: *The mean total cost of SAR was € 172.29, ranging from € 166.22 to € 203.9 (p<0.001) according severity. PAR Patients' total mean cost was € 236.67 (€ 216.59 - € 272.66, p<0.001) PAR+SAR Patients had the highest mean total cost: € 269.94, ranging from € 244.96 to € 295.42 (p<0.001).*
Conclusions: *Perennial allergy and association with asthma clearly contribute to increase costs for treating rhinitis. This study provided evidence concerning the importance of this issue investigating the role of allergic rhinitis in Italy.*
Keywords: Allergic rhinitis, cost of illness, direct cost.

**ARTE: Allergic Rhinitis TEle-application Study

Introduction

Allergic rhinitis is defined by the WHO as a symptomatic disorder of the nose resulting from an IgE-mediated immunological reaction following exposure to an allergen (1). Though it is not usually a serious disease it accounts for a substantial burden of social morbidity. Estimates of the prevalence of allergic rhinitis range from 10% (2) of the US population to as high as 30% among adults and 40% among children (3); in Germany they range from 13.4% to 23% of the adult population (4). In Italy, a study developed in Liguria found the prevalence in 1999-2002 among 18-years old male was 10.15% (5) while a study that enrolled general population aged 20 to 44 years assessed that prevalence was 18.3% (6). In Italy the prevalence of allergic rhinitis is progressively increasing as was about 2.2% in '80 and at present it is about 20% (7).
Classical classification of allergic rhinitis considers two types (8): seasonal and perennial. The seasonal (SAR) and perennial (PAR) forms are distinguished by the allergens that trigger symptoms and by the varying duration and time of year of these symptoms.
PAR and SAR may coexist in the same subject, with more severe symptoms in certain seasons.

Patients with allergic rhinitis experience both physical discomfort, like fatigue, irritability, frequent nose blowing, and detrimental effects on the psychological and social aspects of their own lives Patients may have significant declines in cognitive processing, psychomotor speed, verbal learning and memory during the allergy season (9, 10).

Untreated allergic rhinitis can lead to more serious diseases in the upper and lower airways. It is often associated with asthma, nasal polyps, sinusitis and otitis media (11). According to the literature, asthma in particular and rhinitis frequently coexist (12). The prevalence of asthma in the general population is 3-5% (13),(14) but it affects approximately 38% of Patients diagnosed with allergies and among asthmatic people 60-78% have allergic rhinitis.

Allergic rhinitis is usually treated with topical intranasal corticosteroids, antihistamines, topical anticholinergics and vasoconstrictors, specific immunotherapy (SIT), and, in severe cases, systemic corticosteroids.

The discomfort, cognitive impairment and absenteeism, loss of productivity and the high use of health care resources associated with allergic rhinitis constitute a significant economic toll for the Country's economy.

A literature review confirms the economic burden of allergic rhinitis. Stempel et al. (15) estimated the prescriptions and office visits associated with allergy during 2000 cost $ 6 billion, while Storms et al. (16) using data from a nationwide sample of 15,000 households, estimated it at $ 3.5 billion; Weiss et al. (17) estimated the treatment costs of allergic rhinitis in the US at $ 12.7 billion while Malone estimated reached $ 1.23 billion in 1994. Schramm B et al. (18) estimated the average annual cost of mild and severe asthma and/or SAR in Germany, according to Sickness Funds and Patient's perspective, it was € 1089 for children and € 1543 for the adult population. The wide range of estimates can be attributed to differences in identifying Patients with allergic rhinitis, differences in cost assignment, limitations related to the data available and difficulty in assigning cost for loss of productivity.

From both pharmacological and economic point of view allergic rhinitis has a heavy burden on health care systems.

The ARTE (Allergic Rhinitis: TEle-application study) is a pure observational study developed in year 2003 with the collaboration of a computerized network of Specialist physicians, set out to provide information on the main therapeutic patterns of diagnosis and care of allergic rhinitis and its main complications in Italy. The aim of the study was to estimate the average total cost of Patients with allergic rhinitis and its variability, depending on the characteristics of the sample and type of allergic rhinitis.

Methods

In the present study 280 specialists were involved (allergists; dermatologists; paediatricians; Ear, Nose, Throat (ENT) Specialists and pneumologists) spread in all Italian regions. Each Specialist was required to fill up monthly in between a minimum of 10 to a maximum of 30 data collected on electronic Case Report Form (e-CRF) for each patient. During the entire observational year the data related to 5.781 patients have been collected.

The data acquisition related to seasonal allergic rhinitis, intermittent-seasonal and fixed-chronic was executed through an electronic Case Report Form (e-CRF) in the period from January 2003 and December 2003.

Case Report Form: Physicians were asked to complete two sections:

1. ***Patient's section.*** This part of the e-CRF collected data about:
- Socio-demographic characteristics (sex, age, job, place of residence, date of the first diagnosis)
- Information about other concomitant allergic diseases affecting the Patient and relatives
- Presence of illness/ immune system deficit among relatives
- Prick test results

2. ***Visit's section.*** This section was filled in every time that the patient referred to a centre for a visit. Physicians had to collect information about the visit (first or subsequent), the institution (public or private) where the medical examination took place, the type of allergic rhinitis (SAR and/or PAR) and details on complications. Questions were also asked about the Patient's diagnostic and therapeutic path, i.e.: pharmacological therapy (first and/or second-generation antihistamines, topical corticosteroids, cromolyns, nasal decongestants), duration and dosage. Information was also collected about laboratory tests, GP and Specialist visits and rhinoplasty, performed in the previous 30 days. Moreover, were collected data regarding Patients and caregiver days of work or study lost due to the allergic rhinitis, in the previous 30 days.

Pharmacoeconomic analysis An economic analysis was done to evaluate the cost of allergic rhinitis from Society's point of view. Costs for pharmacological treatment, SIT, diagnostic tests, physician's visits, rhinoplasty, Patients' and Caregivers' loss of production were evaluated. As house modifications (e.g. renovation, replacement of carpets with washable floors, etc.) vary so widely in kind and in price were not considered.

Direct health costs. To asses the costs of prescribed pharmacological therapies, units of consumed resource were multiplied by the prices reported in the official Italian price list (Informatore Farmaceutico, 2003) taking into consideration the dosage and duration of the treatment. Specialist visits, laboratory tests and examinations performed during the observation period were costed using the "National Tariff Nomenclator, 1997". GP's costs were taken as € 16.52 in view of the widely varying amounts of time spent by the doctor depending on the complexity of the visit (prescription only, first diagnosis, medical check up, visiting an elderly person). The estimated figure, close to that paid for occasional surgery visits according to the Italian General Practitioner's Convention (€ 15.49) was calculated starting from the cost of a Specialist surgery visit (€ 20.16) (19), corrected by 7% considering the share of home visits (which cost € 25.82) (20). The cost of SIT was estimated from our survey and the cost of rhinoplasty from the SDO (Scheda di Dimissione Ospedaliera - Hospital Discharge Dataset) available from the Ministry of Health (weighting DRG tariffs by number of day-hospital visits or standard hospitalization).

Indirect costs. The human capital approach was applied to calculate indirect costs arising from lost productivity. The monetary value of one working day lost for Patients was considered of € 98.44 equal to the Gross Domestic Product (GDP) *per capita*/day (21). For housewives, loss of productivity was estimated according to cost-opportunity, considering one day lost worth € 52.00. This was calculated starting from the average hourly cost of domestic help (€ 6.50) (Contratto nazionale dei collaboratori familiari - tariffe 2002) multiplied by eight working hours/day (20).

Statistics. Data were stratified by type of allergic rhinitis and severity. Chi–square tests were used to compare the distribution of categorical variables in the SAR and PAR groups; ANOVA was used to compare mean visits and mean expenditure.

Results

Two hundred eighty-one Specialists (allergists, dermatologists, paediatricians, ENT Specialists and pneumologists) returned valid and complete CRF, corresponding to 5558 Patients. Results are presented according to type of allergic rhinitis (SAR, PAR or SAR+PAR) and disease severity expressed as rhinitis alone, rhinitis and asthma, rhinitis plus other disease (dermatitis, urticaria, cross reactivity).

Patients

Table 1 shows the main details of the 5558 Patients (52.8% male), 54.7% of them with SAR, 18.2% PAR and 27.1% both forms. The mean age of the SAR group was

TABLE 1 - *Demographic and desease specific characteristics of the study population*

	Total n=5558 %	*Seasonal allergic rhinitis* n=3043 (54.7%) %	*Perennial allergic rhinitis* n=1011 (18.2%) %	*Perennial + seasonal allergic rhinitis* n=1504 (27.1%) %	p-value
Male	52,84	53,27	52,82	51,99	
Age (years-mean (S.D.))	31.7 (15.2)	32.1 (14.5)	30.8 (17.0)	31.6 (15.1)	
Age (yerar - classes)					
<15	14,99	12,95	22,06	14,36	p<0.001
15 ≤ y <35	45,52	47,12	38,77	46,81	p<0.001
≥35	39,49	39,93	39,17	38,83	p<0.001
Geographic area					
North	35,16	37,20	34,72	31,32	p<0.001
Centre	19,86	19,95	20,18	19,48	p<0.001
South and Islands	44,98	42,85	45,10	49,20	p<0.001
Job					
Manual worker	10,36	11,57	7,22	10,04	p<0.001
Clerk	16,86	17,15	16,02	16,82	p<0.001
Manager	3,58	3,29	4,06	3,86	p<0.001
Self-employed	9,59	9,79	9,00	9,57	p<0.001
Student	33,92	32,47	37,78	34,24	p<0.001
Teacher	4,80	5,00	4,35	4,72	p<0.001
Housewife	8,78	8,97	7,22	9,44	p<0.001
Retired	2,88	2,60	4,65	2,26	p<0.001
Unemployed	2,61	2,92	2,77	1,86	p<0.001
Other	6,62	6,24	6,92	7,18	p<0.001
Smoking habit					
Never	73,95	75,91	70,13	72,54	p<0.001
Smokers	19,23	17,71	21,07	21,08	p<0.001
Former smokers	6,82	6,38	8,80	6,38	p<0.001
Treatment*					
Specific immunotherapy	20,17	16,96	23,34	24,53	p<0.001
Pharmacologyc therapy	92,25	91,29	92,19	94,22	p<0.001
Degree of severity					
Allergic rhinitis	55,31	60,40	56,08	44,48	p<0.001
Allergic rhinitis+asthma	22,78	19,62	22,26	29,52	p<0.001
Allergic rhinitis+other	21,91	19,98	21,66	26,00	p<0.001

* patients may be treated both by immunotherapy and pharmacologyc therapy

32.1 years, and respectively 30.8 and 31.6 years for PAR and PAR+SAR. There were 75.9% of non-smokers in the SAR group (70.1% PAR), 17.7% of smokers (21.1% PAR) and respectively 6.4% and 8.8% of former smokers (p<0.001). SIT was used by 23.3% of PAR Patients, 17% of SAR ones (p<0.001), and 24.5% for SAR+PAR. The proportion of Patients receiving drugs was respectively 91.3%, 92.2% and 94.2% for SAR, PAR and SAR+PAR. Patients with both forms of allergic rhinitis had a significantly more severe disease (p<0.001) than the other groups: 29.5% of this group reported asthma as well as allergic rhinitis (19.6% SAR and 22.3% PAR) and 26% had other symptoms (20.0% SAR and 21.7% PAR).

Comorbidity

The presence of both SAR and PAR was associated with a high probability of complication (Table 2): 88.2% of SAR+PAR Patients reported complications versus 83.8% for PAR and 75.4% for SAR (p<0.001). SAR Patients had conjunctivitis more than the other groups (14% versus 4.7% and 10.2% in PAR and PAR+SAR p<0.002).

Asthma was reported in 19.7% of Patients with PAR+SAR, and in 14.6% and 13.8% in PAR and SAR. In each type of allergic rhinitis, the percentage of complications was highest in stratum "allergic rhinitis+other", ranging from 89.9% in SAR to 97.1% in PAR+SAR, even if complications like conjunctivitis and nasal polyps were more frequent in "allergic rhinitis" stratum in the PAR and PAR+SAR groups.

TABLE 2 - *Complications by kind of allergic rhinitis and by degree of severity*

	n	Sinusitis		Otitis media		Nasal polyps		Asthma		Conjunctivites		Total complications	
		%	p-value	%	p-value	%	p-value	%	p-value	%	p-value	%	p-value
Seasonal allergic rhinitis		12,55	ns	5,88	ns	4,40	ns	13,80	0,0001	13,97	0,0001	75,35	0,0001
By degree of severity:													
Allergic rhinitis		12,02	ns	5,55	ns	4,41	ns	3,26	0,0001	16,38	0,0001	69,15	0,0001
Allergic rhinitis+asthma	597	14,64	ns	8,39	ns	3,95	ns	12,01	0,0000	16,45	0,0001	79,77	0,0001
Allergic rhinitis+other	608	12,06	ns	4,36	ns	4,86	ns	48,07	0,0000	4,02	0,0001	89,95	0,0001
Perennial allergic rhinitis		21,36	ns	7,62	ns	7,42	ns	14,64	0,0001	4,75	0,0020	83,78	0,0001
By degree of severity:													
Allergic rhinitis	567	19,58	ns	7,23	ns	8,82	ns	5,64	0,0001	6,35	0,0020	80,07	0,0001
Allergic rhinitis+asthma	225	23,29	ns	10,05	ns	4,11	ns	10,05	0,0001	5,02	0,0020	82,65	0,0001
Allergic rhinitis+other	219	24,00	ns	6,22	ns	7,11	ns	41,78	0,0001	0,44	0,0020	94,22	0,0001
Perennial and seansonal allergic rhinitis		22,07	ns	6,05	ns	5,72	ns	19,68	0,0001	10,17	0,0001	88,23	0,0001
By degree of severity:													
Allergic rhinitis	669	20,93	ns	4,48	ns	7,32	ns	7,03	0,0001	14,65	0,0001	80,72	0,0001
Allergic rhinitis+asthma	444	25,83	ns	8,95	ns	4,86	ns	13,81	0,0001	10,74	0,0001	91,05	0,0001
Allergic rhinitis+other	391	20,50	ns	5,86	ns	4,05	ns	43,92	0,0001	2,93	0,0001	97,07	0,0001

Utilisation of resources and lost productivity

Table 3 shows resource use, such as physician and Specialist visits, and lost productivity. Among Patients with SAR the proportion of those needing physician visits was 37.8% and that of Patients requiring Specialist visit was 45.3% (54.7% and 53.2% respectively in the PAR and PAR+SAR groups) Resource use by degree of severity shows that Patients with allergic rhinitis plus other disease were more likely to be referred to a Specialist than Patients with asthma plus rhinitis or rhinitis only. For SAR, PAR and PAR+SAR, the proportion of Specialist visits of the "rhinitis+other" group was respectively 49%, 58.9%, 56.5% while in the "rhinitis" group it was 45.2%, 53.1% and 50.4%. PAR+SAR Patients with asthma reported the highest number of Specialist visits of the sample (1.1 visits) while in the SAR group Patients with asthma refer to a Specialist only 0.638 times.

Loss of production or school days occurred more frequently in SAR+PAR Patients (12.8%, 16.9% in the "rhinitis+asthma" group) than in SAR and PAR (7.2% and 11.2%). In the whole sample a mean of 0.62 days were lost, ranging from 0.45 for SAR to 0.85 in the PAR+SAR group (all differences are significant, $p< 0.001$). People with asthma related symptoms reported the highest losses of production in the SAR and PAR+SAR groups -0.63 and 1.1- while in the PAR group 1.2 days were lost in the rhinitis+other group.

Figure 1 shows the share of the sample using specific immunotherapy. There were significant differences ($p< 0.001$) in SIT use for different degrees of illness

TABLE 3 - *Resource use by kind of allergic rhinitis and by degree of severity (annual values).*

		GP visit			Specialist visit			Working or school days lost		
	n	%	mean	SD	%	mean	SD	%	mean*	SD
Total sample	5558	-	0,59	1,15	-	0,82	1,30	-	0,62	2,08
Seasonal allergic rhinitis	3043	37,76	0,54	1,00	45,35	0,71	1,22	7,20	0,45	1,70
By degree of severity:										
Allergic rhinitis	1838	39,93	0,57	1,10	45,21	0,71	1,28	5,82	0,37	1,48
Allergic rhinitis+asthma	597	34,84	0,50	0,83	42,04	0,64	1,12	9,88	0,63	2,00
Allergic rhinitis+other	608	34,05	0,48	0,81	49,01	0,81	1,11	8,72	0,55	1,98
Perennial allergic rhinitis	1011	36,80	0,53	0,83	54,70	0,88	1,14	11,18	0,76	2,41
By degree of severity:										
Allergic rhinitis	567	38,45	0,53	0,81	53,09	0,80	1,02	8,11	0,50	2,11
Allergic rhinitis+asthma	225	39,11	0,60	0,95	54,67	0,90	1,07	14,67	1,01	2,49
Allergic rhinitis+other	219	30,14	0,44	0,75	58,90	1,09	1,43	15,53	1,16	2,92
Perennial and seasonal allergic rhinitis	1504	39,89	0,72	1,55	53,19	1,00	1,51	12,83	0,85	2,46
By degree of severity:										
Allergic rhinitis	669	40,66	0,75	1,57	50,37	0,90	1,46	9,57	0,57	1,84
Allergic rhinitis+asthma	444	41,67	0,73	1,63	54,50	1,09	1,72	16,89	1,08	2,43
Allergic rhinitis+other	391	36,57	0,67	1,39	56,52	1,06	1,34	13,81	1,06	3,25

* all differences are significative at $p< 0.001$

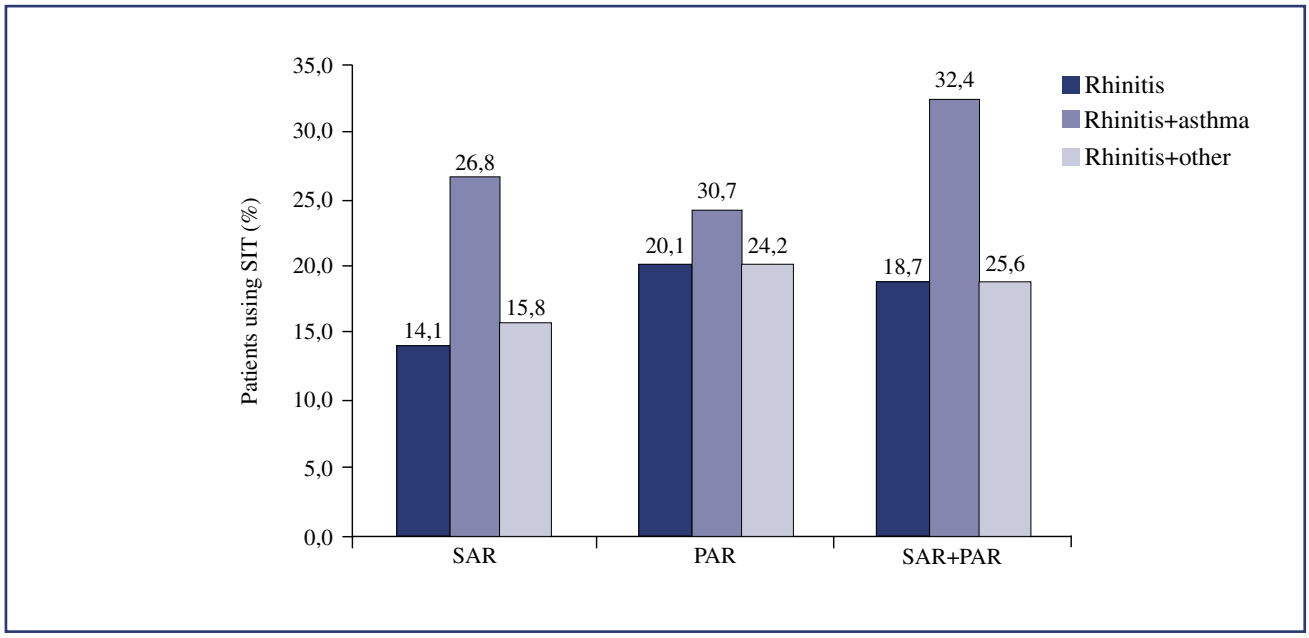

FIGURE 1

Percentages of patients using specific immunotherapy (SIT) by severity.

severity, in all types of allergic rhinitis. Fewer Patients with rhinitis alone or "rhinitis+other" had required SIT than "rhinitis+asthma" Patients.

Pharmacological treatment was received by 91.3% of Patients with SAR, 92.2% with PAR and 94.2% with PAR+SAR; second-generation antihistamines were the most prescribed drug, used by 80.2%, 80.3% and 84.6% respectively in SAR, PAR and PAR+SAR.

FIGURE 2

Resource utilisation by different kind of allergic rhinitis and severity.

Medical and non-medical costs

Figure 2 and Table 4 show the direct and indirect costs and percentage of resource utilisation.

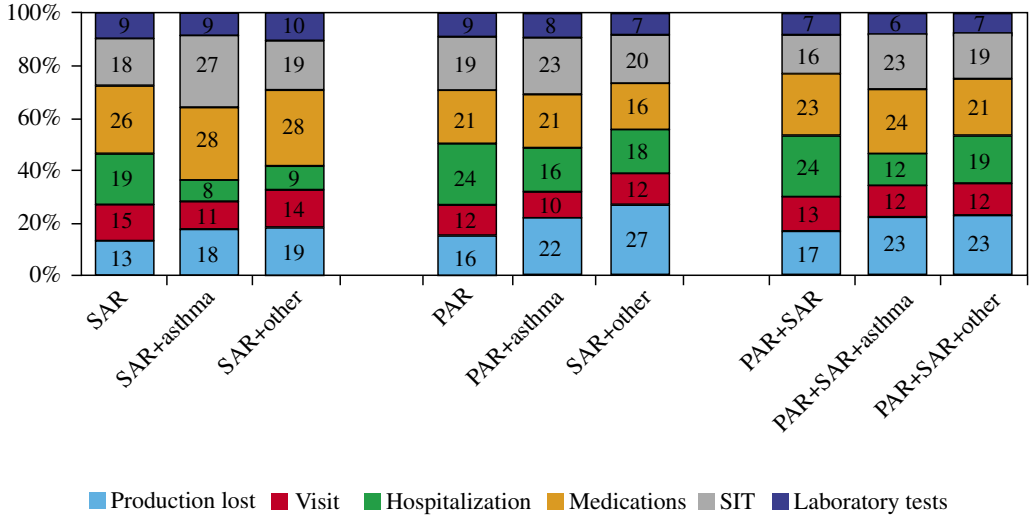

TABLE 4 - *Patient direct health costs by kind of allergic rhinitis and by degree of severity (annual values).*

	n	Physician visits		Drugs		SIT costs		Hospitalization		Laboratory tests		Total direct health costs	
		mean (€)	%	mean (€)	%	mean (€)	%	mean (€)	%	mean (€)	%	mean (€)	%
Total sample	5558	26,67	12,67%	50,54	24,02%	41,67	19,80%	36,09	17,15%	16,96	8,06%	171,92	81,70%
Seasonal allergic rhinitis	3043	23,68	13,74%	46,18	26,80%	35,03	20,33%	24,98	14,50%	15,64	9,08%	145,50	84,45%
By degree of severity:													
Allergic rhinitis	1838	24,02	14,81%	41,46	25,56%	29,22	18,01%	30,80	18,99%	14,98	9,24%	140,49	86,60%
Allergic rhinitis+asthma	597	21,51	10,55%	57,96	28,43%	55,36	27,15%	16,26	7,97%	16,18	7,94%	167,28	82,04%
Allergic rhinitis+other	608	24,77	14,43%	48,85	28,45%	32,62	19,00%	15,96	9,30%	17,08	9,95%	139,29	81,12%
Perennial allergic rhinitis	1011	26,92	11,37%	46,50	19,65%	48,22	20,38%	48,00	20,28%	19,72	8,33%	189,36	80,01%
By degree of severity:													
Allergic rhinitis	567	25,20	11,64%	44,67	20,63%	41,53	19,18%	51,35	23,71%	19,94	9,20%	182,70	84,35%
Allergic rhinitis+asthma	225	28,53	10,46%	56,33	20,66%	63,35	23,23%	43,13	15,82%	20,78	7,62%	212,13	77,80%
Allergic rhinitis+other	219	29,69	11,80%	41,11	16,34%	49,99	19,86%	44,32	17,61%	18,08	7,18%	183,20	72,79%
Perennial and aseasonal allercic rhinitis	1504	32,55	12,06%	62,08	23,00%	50,68	18,78%	50,55	18,73%	17,77	6,58%	213,63	79,14%
By degree of severity:													
Allergic rhinitis	669	30,97	12,64%	57,39	23,43%	38,60	15,76%	58,03	23,69%	17,59	7,18%	202,58	82,70%
Allergic rhinitis+asthma	444	34,59	11,71%	71,82	24,31%	67,00	22,68%	36,43	12,33%	17,16	5,81%	227,00	76,84%
Allergic rhinitis+other	391	32,94	11,61%	59,02	20,80%	52,83	18,62%	53,78	18,95%	18,76	6,61%	217,34	76,59%

all differences are significative at p< 0.001

SIT: specific immunotherapy

Annual total cost ranged from € 172.29 per Patient with SAR to € 269.94 per Patient with PAR+SAR (all differences among kind of allergic rhinitis and disease severity are significative at p<0.001). Direct medical costs accounted for about 82% of the total costs in the whole sample (84% in SAR, 80% in PAR, 79% in PAR+SAR) while Patients and caregivers production losses accounted for 18% (16%, 20%, 21% respectively for SAR, PAR and PAR+SAR).

Direct medical costs were € 145.5 in the SAR group, € 189.36 for PAR and € 213.63 for PAR+SAR (p<0.001); Patients with allergic rhinitis and asthma spent the most for direct health costs in each study group: € 167.28 in SAR, € 212.13 in PAR and € 227.00 in PAR+SAR. Among direct medical costs medications were the greatest burden, accounting for about 32%, 25%, 29% of total health costs respectively in SAR, PAR and PAR+SAR followed by SIT (24%, 25%, 24%), hospitalization (17%, 25%, 24%), physician costs (16%, 14%, 15%) and laboratory tests (11%, 10%, 8%). According to severity, Patients with asthma spent more than other Patients for medications and SIT (€ 57.96 and 55.36 in the SAR group, € 56.33 and 63.35 for PAR and € 71.82 and 67.00 for SAR+PAR) while Patients with rhinitis only spent more for hospitalisation, i.e. rhinoplastic (€ 30.80, 51.35 and 58.03).

Mean productivity lost was worth from € 26.79 in the SAR group to € 56.31

for PAR+SAR while in PAR group mean value of productivity lost was € 47.31 (p<0.001). Patients with PAR plus other symptoms reported the highest cost (€ 68.48) for productivity lost and the lowest was reported by SAR Patients with rhinitis only (€ 21.73, p<0.001).

Discussion

This study assessed the average cost of allergic rhinitis in Italy, comparing different kind of rhinitis and illness severity. There were substantial differences in total cost for different types of allergic rhinitis and different degrees of severity. This study identified direct cost as the main factors for Patients with allergic rhinitis: it accounted for 82% of the total cost, while indirect cost weighed in at only 18% (€ 38.5). Schadlich et al (23) estimate € 21.42 for indirect cost both in SAR and PAR patients.

Indirect costs are often estimated by multiplying Patients wages by the amount of time lost from work due to the illness.

This is appropriate when health is so seriously impaired by symptoms as to require absence from work. Impairment associated with allergic rhinitis may be less severe, so the number of days lost is minimal (24). In our study the average number of days lost per employee each year ranged from 0.4 to 1.1.

Therefore estimates of days lost from work due to allergic rhinitis would underestimate the indirect cost (25). The majority of indirect costs associated with allergic rhinitis are imputable to reduced performance on the job, but as this reduction of productivity is very difficult to measure, often it is not considered.

TABLE 5 - *Patient total costs by kind of allergic rhinitis and by degree of severity (annual values).*

		Direct health costs		Indirect costs		Total costs
	n	mean (€)	%	mean (€)	%	mean (€)
Total sample	5558	171,92	81,70%	38,51	18,30%	210,43
Seasonal allergic rhinitis	3043	145,50	84,45%	26,79	15,55%	172,29
By degree of severity:						
Allergic rhinitis	1838	140,49	86,60%	21,73	13,40%	162,22
Allergic rhinitis+asthma	597	167,28	82,04%	36,62	17,96%	203,90
Allergic rhinitis+other	608	139,29	81,12%	32,41	18,88%	171,70
Perennial allergic rhinitis	1011	189,36	80,01%	47,31	19,99%	236,67
By degree of severity:						
Allergic rhinitis	567	182,70	84,35%	33,89	15,65%	216,59
Allergic rhinitis+asthma	225	212,13	77,80%	60,52	22,20%	272,66
Allergic rhinitis+other	219	183,20	72,79%	68,48	27,21%	251,67
Perennial and aseasonal allercic rhinitis	1504	213,63	79,14%	56,31	20,86%	269,94
By degree of severity:						
Allergic rhinitis	669	202,58	82,70%	42,38	17,30%	244,96
Allergic rhinitis+asthma	444	227,00	76,84%	68,41	23,16%	295,42
Allergic rhinitis+other	391	217,34	76,59%	66,42	23,41%	283,76
all differences are significative at p< 0.001						

The allergic rhinitis costs found are generally lower than others published in European and USA cost-of-illness studies.
Differences in total average cost per Patient among these studies may be due to differences between inclusion/exclusion criteria, cost assessment, treatment and health care systems.
This influences the estimates of total costs so they are lower than in other reports, such as Schramm et al. (18) whose estimated total average cost of SAR was € 1,543 for adults and € 1,089.00 for a child/adolescent, or Schadlich et al (23) who found costs of SAR and PAR were respectively € 760.41 and € 1,122.00.
In spite of these limits, the large number of Patients enrolled, distributed all over Italy, enabled us to asses the average national total cost of allergic rhinitis according to type and severity, describing the patterns of diagnosis and therapies of SAR and PAR. It helps enrich the literature in a field marked by scarcity of studies assessing the economic burden of these pathologies in Italy.

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