

Effects of the COVID-19 pandemic on head lice and scabies infestation dynamics: a population-based study in France

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Summary

Background. Lockdowns and physical distancing have dramatically limited the circulation of SARS-CoV-2 and other common communicable infections. However, little is known about their impact on head lice and scabies.

Aim. To assess the impact of the 2020 French National lockdowns (17 March–11 May 2020, and 30 October–15 December 2020) and physical distancing recommendations (from February 2020) on the dynamics of head lice and scabies infestations.

Methods. The weekly sales of topical head lice treatments, topical scabies treatments and oral ivermectin were extracted from the database of the healthcare science company IQVIA (60% of all French retail pharmacies) and analysed over a 5-year period (March 2016–December 2020). A periodic regression model was fitted to drug sales before the COVID-19 period (2016–2019) and extrapolated to compare the observed sales in 2020 to the expected sales.

Results. A decrease of the sales of tracer topical treatments for head lice and scabies was observed from March 2020, synchronously with the first French national lockdown. For the period March–December 2020, the mean reduction in observed vs. expected sales for head lice and scabies topical treatments was 44% and 14%, respectively. By contrast, although there was an observed decrease in oral ivermectin sales after March 2020, it was much lower (4%), probably because of studies reporting the potential positive effects of this drug on COVID-19 infection.

Conclusion. COVID-19 lockdown and physical distancing reduce circulation of head lice and scabies in France. Further studies are needed to assess the long-term impact of these social behaviour changes.

Introduction

In response to the COVID-19 pandemic spread in 2020, many governments introduced measures of

physical distancing, rapidly followed by measures of social isolation. In France, strict home confinement was mandatory for most of the population from 17 March to 11 May 2020 with people allowed only 1 h per day outside their home and limited physical interactions with people outside their family. All schools (both primary and secondary) and universities were closed from 12 March to 11 May 2020 and reopened only progressively from 11 May to 30 June 2020 (the summer holidays then occurred from 6 July to 2 September 2020). A second phase of home confinement was imposed during the second COVID-19 wave, covering the period 30 October–15 December 2020. In

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addition, outside the lockdown periods, strict physical distancing was recommended. Periods of intensive lockdown with home confinement were demonstrated to be the most effective method in reducing the number of COVID-19 new cases and the risk of healthcare system collapse.¹ As well as the effects in reducing SARS-CoV-2 transmission, lockdowns and physical distancing also dramatically limited the circulation of other common communicable respiratory infections such as influenza.² Their effects on communicable nonrespiratory infections have also been studied, with contradictory results, in particular for sexually transmitted infections.^{3–8} However, there have been few published data regarding two frequent nonrespiratory communicable infections, head lice and scabies.

The aim of this study was to assess the impact of the 2020 French national recommendations on lockdowns and physical distancing on the dynamics of head lice and scabies infestation as estimated by the national sales of tracer drugs over a 5-year period before and during the COVID-19 pandemic.

Methods

Use of the database for scientific purpose has been approved by the French regulatory authority CNIL (Centre National de l'Informatique et des Libertés). All the data used for this study were anonymized.

Data sources

The database of the healthcare science company IQVIA Pharmaone LMPPO was used. This database provides dispensing data of prescription and over-the-counter (OTC) drugs from 14 000 pharmacies in mainland France (60% of all French retail pharmacies). The data collected include European Pharmaceutical Market Research Association anatomical therapeutic chemical and OTC classification and the number of boxes sold.

We selected prescribed and OTC drugs used for head lice and scabies including topical head lice treatments (all lotions, shampoos, sprays, creams, ointments in the OTC class 86H1 (IQVIA classification for medications dedicated to head-lice treatments available without a prescription at a local retail pharmacy), including all head-lice treatments containing dimeticone, decamethylcyclopentasiloxane, essential oils, permethrin or phenothrin), topical scabies treatments (permethrin, benzyl benzoate, benzyl benzoate/sulfiram) and oral ivermectin. All data were collected and prospectively registered in the database from

March 2016 to December 2020, and we used the data of the 14 000 participating pharmacies to extrapolate to the total number of sales over the whole country. The data are available upon reasonable request.

Statistical calculations

To estimate the impact of the COVID-19 pandemic on the number of boxes of medicines sold during the pandemic in comparison to the preceding 4 years and to take into account seasonality of sales, a model was fitted to drug sales in the pre-COVID-19 period (2016–2019) using a linear trend and periodic regression terms as follows:

$$\log(y_{(w)}) = a_0 + a_1 \times w + a_2 \times \cos(2\pi \times w/52 + \varphi_1) + a_3 \times \cos(4\pi \times w/52 + \varphi_2) + \varepsilon_{(w)},$$

where $y_{(w)}$ is the modelled quantity for Week w and $\varepsilon_{(w)}$ a normally distributed random error.

We used the moving average of the sales number to limit the impact of national holidays on the sales variation. The coefficients of the regression were estimated by least squares minimization. Following the Serfling method used in the Sentinelles network,⁹ the fitted model was used to predict the expected value of $y_{exp}(w)$ over the year 2020 as well as a 95% expected interval:

$$y_{exp}(w) \pm 1.96 \times s,$$

where s is the residual standard deviation.

The year 2020 was split in four periods: pre-Lockdown 1, Lockdown 1 (17 March–11 May), post-Lockdown 1 (12 May–29 October) and Lockdown 2 (30 October–15 December). We computed the relative reduction (RR) between expected and observed values during each period as

$$RR = 1 - (\Sigma y_{(w)}) / (\Sigma y_{exp}(w)),$$

where the sum was over the number of weeks in each period.

Results

Treatment sales

During the study period, a total of 22 429 950 packs of topical head-lice treatments (usually one unit per pack), 2 378 823 packs of topical scabies treatments

(usually one unit per pack) and 20 087 680 ivermectin 3 mg pills (5 087 507 pack units) were sold in France (Fig. 1). A clear decrease in topical treatment sales was observed from March 2020, for both head lice and scabies, synchronously with the first French national lockdown (Fig. 1). The decrease in ivermectin sales was lower.

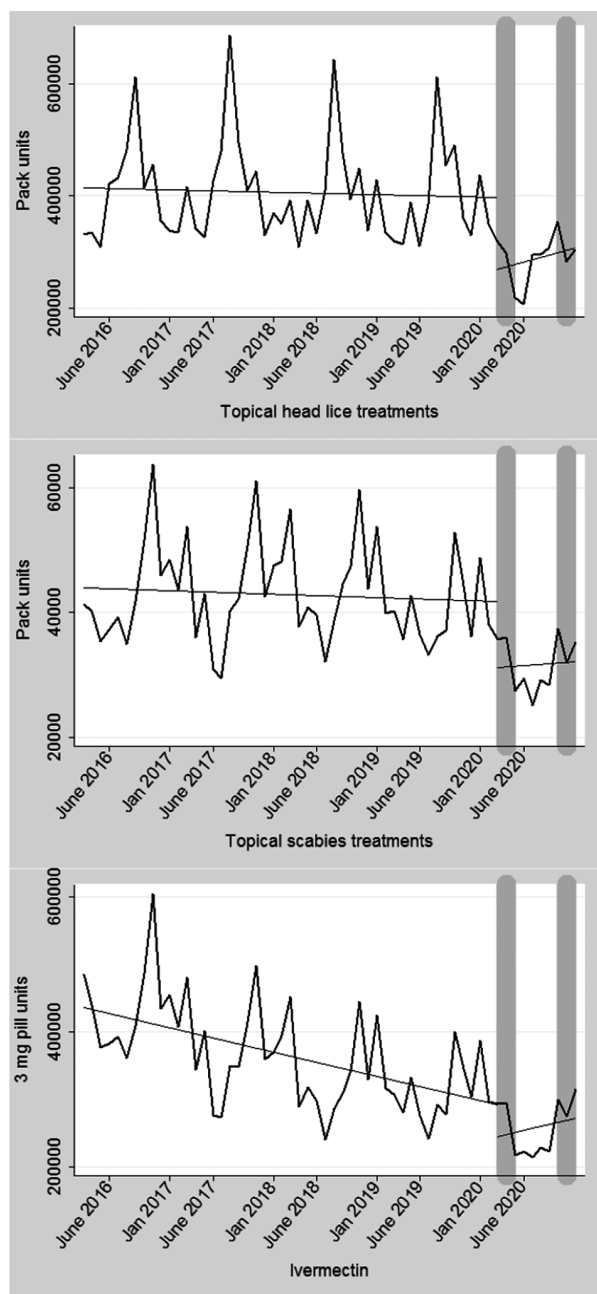


Figure 1 Dynamics of sales over the 2016–2020 period. The grey areas represent the two national lockdowns.

Seasonal variation

The seasonal variations in drug sales in the period 2016–2019 was well captured by the models, both for head lice ($R^2 = 0.93$) and scabies ($R^2 = 0.87$) (Fig. 2). The observed values for all weeks in the 2016–2019 period remained within the prediction intervals.

Observed vs. expected sales

Regarding the year 2020, the differences between the observed and expected sales are summarized in Table 1. Combining the three periods from Lockdown 1 to Lockdown 2, the mean reduction in observed vs. expected sales for head lice topical treatments, scabies topical treatments and oral ivermectin was 44%, 14% and 4%, respectively. The dynamics of topical scabies treatments and oral ivermectin sales classified by patient age are shown in Fig. 3; no major age-related differences were found.

Discussion

This study shows that the 2020 French national lockdowns and physical distancing recommendations strongly limited the infestation dynamics of two frequent communicable conditions involving ectoparasites of the human being, i.e. head lice and scabies. It was previously reported that the first French national lockdown reduced the SARS-CoV-2 reproductive number from 2.90 to 0.67, corresponding to a 77% reduction in the virus transmission,¹⁰ but we found that

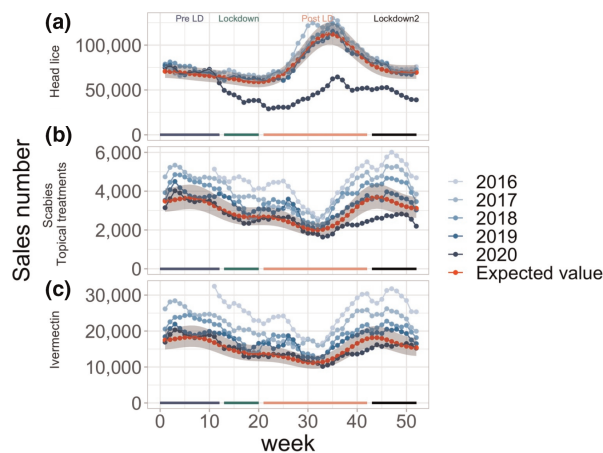


Figure 2 Sales of (a) topical head lice treatments, (b) topical scabies treatments and (c) ivermectin in France observed in 2020 (dark blue) compared with expected sales (red). All data are reported in pack units. LD, lockdown.

Table 1 Difference between observed and expected sales of units of scabies and head lice treatments in 2020 compared with the preceding 4 years in France.

| Disease | Period | Total number of sales ^a | | Reduction, % ^b |
|--------------------------------------|-----------------|------------------------------------|-----------|---------------------------|
| | | Observed | Expected | |
| Head lice (topical treatments) | Pre-Lockdown 1 | 842 499 | 813 829 | -4 ^a |
| | Lockdown 1 | 332 593 | 488 817 | 32 |
| | Post-Lockdown 1 | 977 135 | 1 953 075 | 50 |
| | Lockdown 2 | 468 475 | 717 153 | 35 |
| Scabies (topical treatments) | Pre-Lockdown 1 | 42 313 | 41 895 | -1 |
| | Lockdown 1 | 20 526 | 22 039 | 7 |
| | Post-Lockdown 1 | 48 977 | 55 318 | 11 |
| | Lockdown 2 | 26 332 | 34 154 | 23 |
| Ivermectin (oral systemic treatment) | Pre-Lockdown 1 | 223 528 | 212 072 | -5 |
| | Lockdown 1 | 113 136 | 114 581 | 1 |
| | Post-Lockdown 1 | 279 159 | 292 730 | 5 |
| | Lockdown 2 | 159 430 | 168 356 | 5 |

^aNumbers are pack units. ^bThese figures are the percentage reduction, thus negative figures are increases.

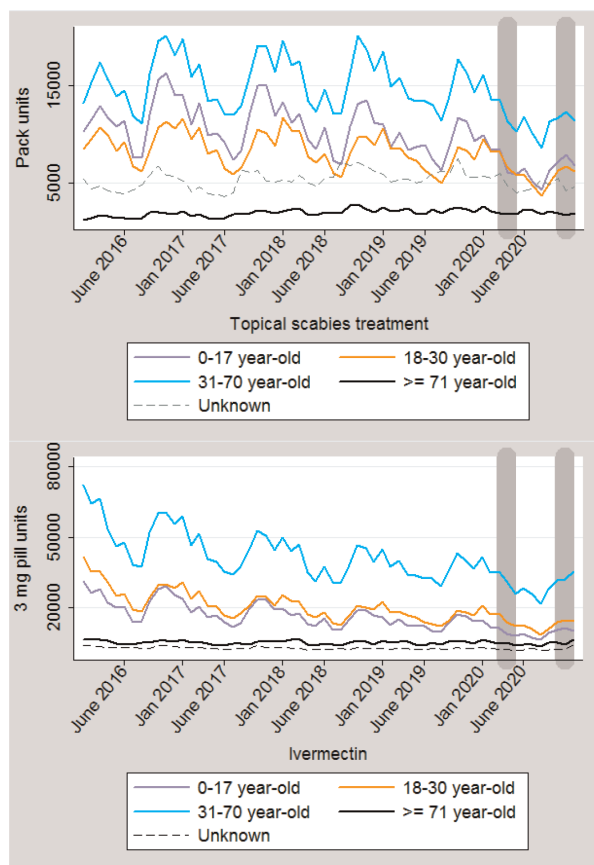


Figure 3 Dynamics of topical scabies treatments (top) and ivermectin (bottom) sales according to age. The grey areas represent the two national lockdowns.

the reduction observed for head lice and scabies was lower, ranging from 7% to 32%. However, this reduction persisted and intensified over time.

The impact of lockdowns on the dynamics of head lice and scabies infestation has been poorly studied. A cross-sectional descriptive study was recently performed in Argentina, using a questionnaire distributed via different types of social media, and this showed a 35% decrease in the incidence of head lice in school-age children.¹¹ Regarding scabies, a Spanish study reported the unexpected finding a crude increase in the number of cases during the national lockdown,¹² and other studies also reported an increase in the scabies ‘frequency’.^{13–15} However, these studies also reported an increase in the frequency of many other severe or disabling dermatological conditions, which can probably be explained by a dramatic decrease in the total number of dermatological consultations for benign conditions during the pandemic.

We found that the impact of lockdown was lower on scabies than on head lice. Even though data on the dynamics of transmission of head lice and scabies under normal social conditions in Europe and high-income countries are scarce, it is known that these two diseases affect different risk groups in different circumstances.^{16–21} Head-lice transmission is primarily between different households, with some transmission within the same household, whereas scabies transmission is primarily within a household and only secondarily between different households. The primary risk group for head lice is children in elementary schools whereas the primary risk groups for scabies is young adults and residents/staff of institutions and long-term facilities. In this context, it is likely that the level and types of lockdown operating in France had different impacts on the different risk groups. The total school closure for 2 months, followed by a partial closure for

another 6 weeks and by summer holidays for a further 2 months, may explain the high impact of the first lockdown on the prevalence of head lice. Although scabies is also transmitted via direct contact, the impact of lockdowns on its transmission may have been different in sexually transmitted cases (lockdown measures were probably not as well respected by young adults as by children), or in cases occurring as institutional outbreaks (e.g. nursing homes, prisons, long-term care facilities) or in displaced or homeless people.

The decrease in ivermectin sales during the pandemic was much lower than that observed for topical scabies treatments. This can probably be explained by concomitant reports of a potential positive effect of ivermectin on the COVID-19 infection,²² which may have led to purchases that were intended for COVID-19 treatment rather than for scabies, therefore the decrease for specific scabies use may have been higher than the observed data.

Even though this was not part of the study aims, we had an incidental finding of obvious seasonality in the occurrence of scabies (mostly during winter) and head lice (mostly after summer holidays). Similar results have already been published for scabies and head lice.^{16,17,23–25} We also observed declining trends in consumption for ivermectin over the study period, which began long before the COVID pandemic; this was an unexpected finding, which we cannot explain. In particular, there were no available data regarding incidence changes of scabies in France over the past 10 years.

This study has several limitations. First, it did not directly assess the incidence of the two diseases but rather focused on sales of treatments for them. Even though topical treatments for both head lice and scabies are very specific and therefore can be considered as very good tracer drugs, other methods of treatment (in particular fine combing for head lice) were not investigated. Second, scabies treatments are available only on prescription in France, and the decrease in sales may reflect the decrease in medical consultations during the COVID-19 pandemic. However, available studies have reported that scabies (and itching) was one of the dermatological conditions still leading to dermatological consultations during lockdowns.^{13–15} Lastly, OTC drugs can also be sold online by French pharmacists and it can be hypothesized that the sale of OTC drugs used to treat head lice may have moved away from pharmacies to online stores during the pandemic. However, most pharmacists use the same software for direct and online sales, which means that

online sales should have been captured in the present data.

Conclusion

We show for the first time at a national level the positive impact of the national lockdown and physical distancing recommendations on head lice and scabies, two nonrespiratory infections transmitted via direct contact. Further studies are needed to assess the long-term impact of social behaviour changes induced by the COVID-19 pandemic.

What's already known about this topic

- COVID-19 lockdowns have dramatically limited the circulation of communicable respiratory infections.
- Little is known about their impact on nonrespiratory communicable diseases.

What does this study add

- We performed a study in France assessing sales of treatments for head lice and scabies during the lockdown and social-distancing periods following the COVID-19 outbreak, and compared them with the pre-COVID-19 period
- We observed a reduction of 44% and 14% in the number of observed head lice and scabies treatments, respectively during the COVID-19 pandemic.

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