SARS-COV-2 AND THE DISAPPEARANCE OF SEROTYPE 12F IPD AMONG ADULTS IN GERMANY

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BACKGROUND

Invasive Pneumococcal Disease (IPD) among adults in Germany has been monitored by the GNRCS since 1992. During the SARS-CoV-2 pandemic, a strong reduction in IPD cases among adults was observed. Here we report on the disproportional reduction of IPD cases caused by serotype 12F among adults in Germany, during the worldwide pandemic.

METHODS

Isolates were serotyped using the Neufeld Quellung reaction. Species identification was confirmed using bile-solubility-test, optochin-test and various PCR-tests.

RESULTS

SARS-CoV-2 reached Germany at the beginning of March 2020. Both among children as well as among adults, reported IPD cases decreased considerably from this time on (**Fig.1** and **Fig.2**). This effect seems to be induced by hygiene and social distancing measures, and not by reduced reporting, as reported Group B-Streptococcus cases showed no change (**Fig.3**).

With annulment of the social distancing restrictions in autumn 2021, reported IPD case numbers have increased to pre-pandemic levels, both among children, and adults. For children, case numbers per week stayed on prepandemic levels in 2022 (**Fig. 1**). For adults, in the first ten weeks of 2022, case numbers were higher than in the same period in 2021, but still considerably lower than in the pre-pandemic years 2018 and 2019 (**Fig. 2, Tab. 1**). The strongest reduction was observed in the age group >75 years.

In the pre-pandemic period June 2019 – March 2020, 2331 IPD cases were reported among adults ≥18 years of age. In the period June 2020 – March 2021 only 789 IPD cases appeared, a reduction of 66% compared to the pre-pandemic period. This decline is accompanied by a disproportional reduction (-88%) of serotype 12F cases from 109 (4.7%) in the pre-pandemic period (June 2019 – March 2020) to 13 (1.6%) in the pandemic period (June 2020 – March 2021). In the late-pandemic period (June 2021 – March 2022), 1595 IPD cases were reported, 32% less than in the pre-pandemic period, of which only 14 (0.9%) were associated with serotype 12F (**Fig.4, Fig.5, Tab.2**).

The proportion of serotype 22F cases also showed a reduction over the course of the pandemic, reducing from 188 cases (8.1%) in the pre-pandemic period, to 37 cases (4.7%), and 73 cases (4.6%) in the pandemic and late-pandemic period, respectively (**Fig.4, Tab.2**).

Serotype 12F prevalence shows long term fluctuation, with a downward trend since 2016-2017. The reduction in the last two seasons, 2020-2021 and 2021-2022, however, is much more pronounced than the overall trend (**Fig.6**). In contrast, serotype 22F prevalence shows a long term increasing trend, with a sudden decrease during the pandemic (**Fig.7**).

The proportions of the other serotypes showed much less change over the course of the pandemic, with a slight increase of serotypes 3 and 19A cases in the late-pandemic period (**Tab.2**).

The observed reduction in adult IPD cases associated with serotypes 12F and 22F slightly reduced the predicted serotype coverage of PCV20 and PPV23, by 3 to 4 percent points each. This represents a reduction of the added benefit in serotype coverage compared to PCV13 from 9.5% to 5.3% for PCV15 over the pandemic, and from 35.8% to 26.4% for PCV20 (**Fig.8, Tab.2**).

CONCLUSIONS

- The SARS-CoV-2 pandemic had a strong reducing effect on IPD among children and adults in Germany. Three times fewer cases were observed, most probably caused by reduced respiratory transmission.
- This decline was accompanied by a disproportional reduction of serotype 12F cases (-88%) among adults in the pandemic period year, with prevalence reducing from 4.7% to 0.9%.
- Also serotype 22F prevalence reduced from 8.1% to 4.6% during the pandemic.
- Prevalence of serotypes 3 and 19A slightly increased in the late-pandemic period (June 2021 – March 2022).
- Overall serotype coverage of PCV20 and PPV23 was reduced by 3 to 4%.
- The added benefit in serotype coverage compared to PCV13 was reduced by 4.2 percent points for PCV15 and 9.4 percent points for PCV20.

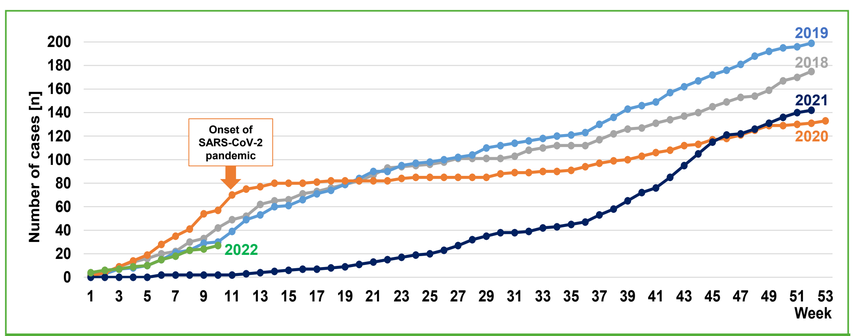

Fig. 1: Cumulative number of reported IPD cases from children <18 years of age in Germany

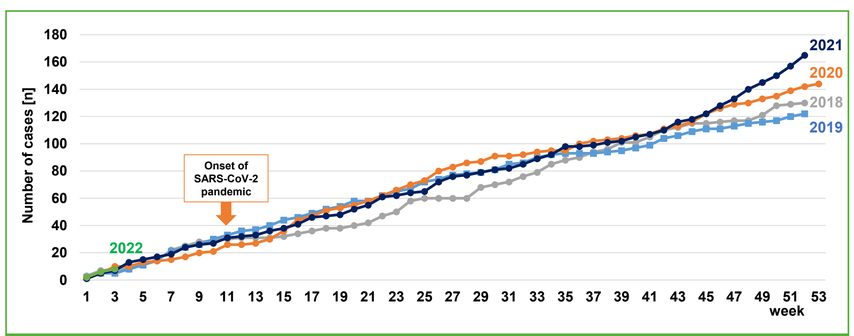

Fig. 3: Cumulative number of reported invasive Group-B streptococcal disease cases among all ages in Germany.

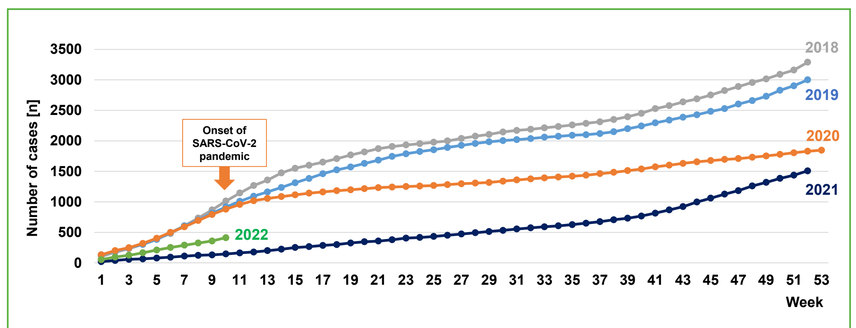

Fig. 2: Cumulative number of reported IPD cases from adults ≥ 18 years of age in Germany

Tab. 1: IPD case numbers among adults from Nov 15 – Dec 31, 2021 and Jan 1 – Mar 15, 2022, compared to the same periods in 2018 and 2019

Age group (years)	Nov 15 - Dec 31, 2021 cases (n=)	Nov 15 - Dec 31, 2018 cases (n=)	Nov 15 - Dec 31, 2019 cases n=)	Reduction 2021 vs. 2018 (%)	Reduction 2021 vs. 2019 (%)
18-49	87	83	89	4,8	-2,2
50-59	91	100	103	-9,0	-11,7
60-75	253	270	263	-6,3	-3,8
>75	246	298	264	-17,4	-6,8
Age group (years)	**Jan 1 - Mar 15, 2022 cases (n=)**	**Jan 1 - Mar 15, 2018 cases (n=)**	**Jan 1 - Mar 15, 2019 cases (n=)**	**Reduction 2022 vs. 2018 (%)**	**Reduction 2022 vs. 2019 (%)**
18-49	71	126	113	-43,7	-37,2
50-59	73	150	132	-51,3	-44,7
60-75	178	406	342	-56,2	-48,0
>75	148	396	361	-62,6	-59,0

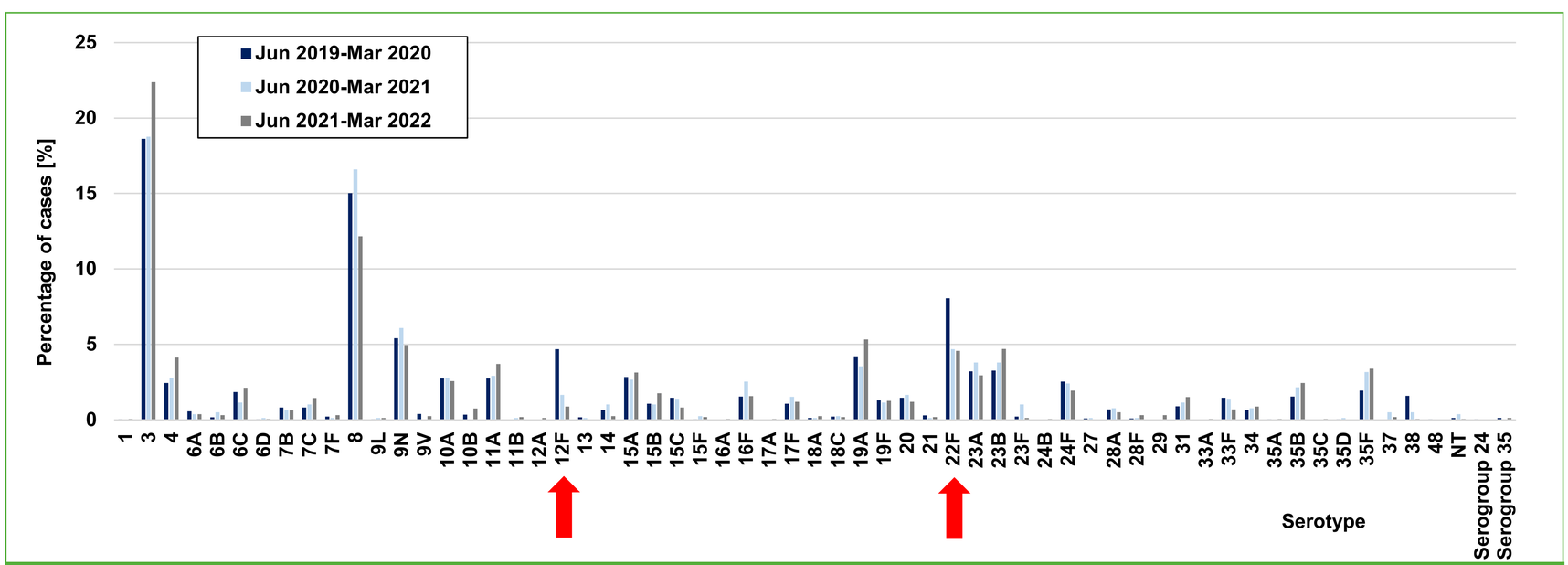

Fig. 4: Serotype distribution of IPD cases among adults ≥18 years of age, June 2019 – March 2020 (pre-pandemic period), Jun 2020 – March 2021 (pandemic period) and June 2021 – March 2022 (late-pandemic period)

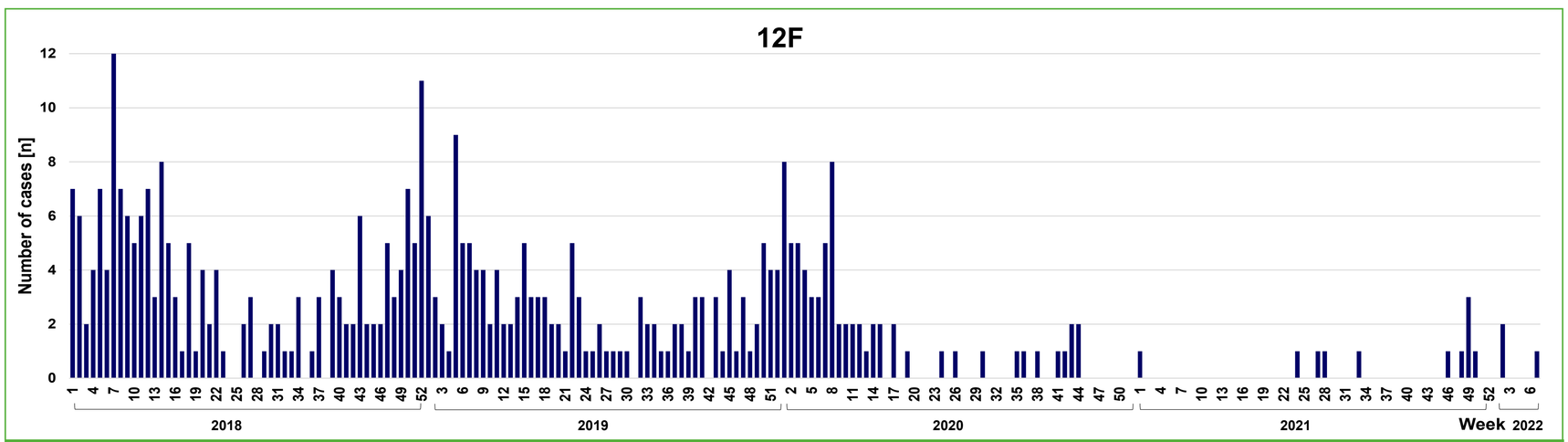

Fig. 5: Number of IPD cases among adults ≥18 years of age with serotype 12F in Germany per calendar week

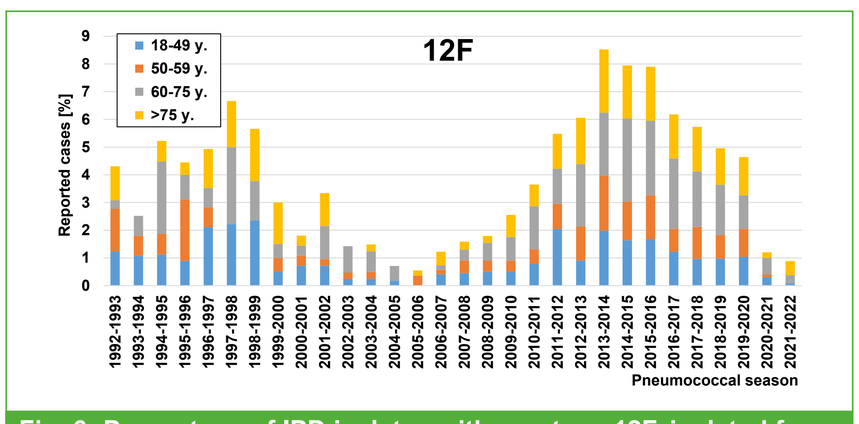

Fig. 6: Percentage of IPD isolates with serotype 12F, isolated from adults ≥18 years of age

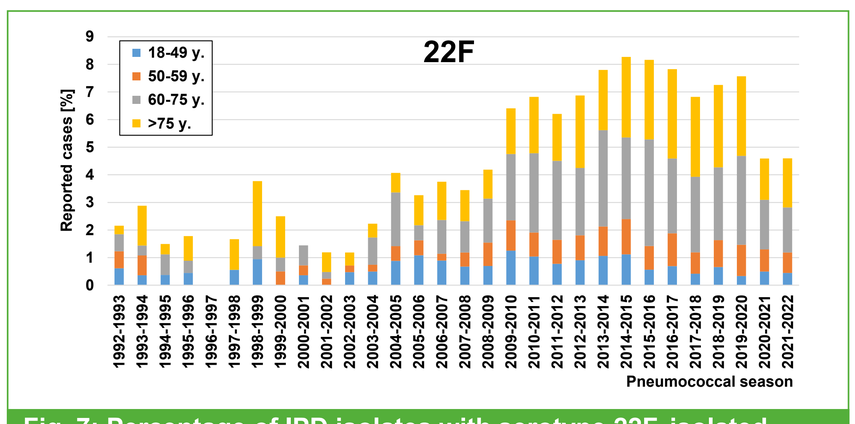

Fig. 7: Percentage of IPD isolates with serotype 22F, isolated from adults ≥18 years of age

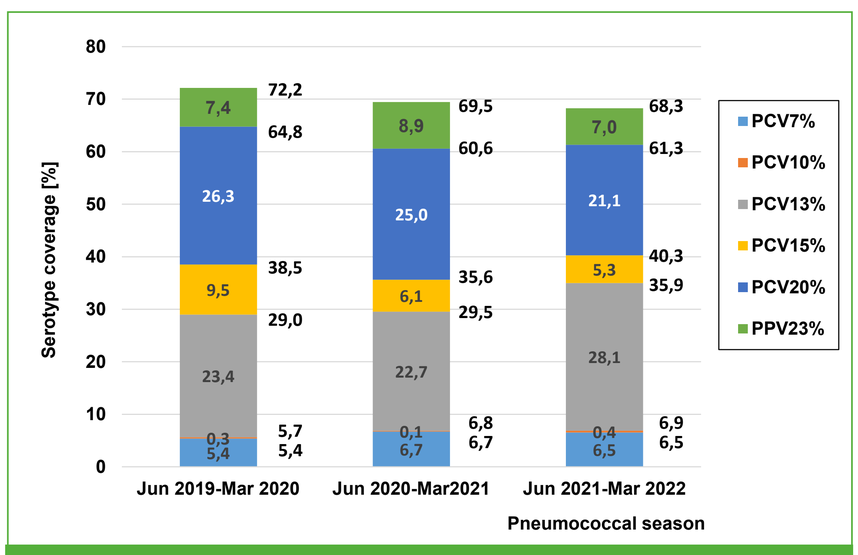

Fig. 8: Serotype coverage of different vaccine formulations among IPD cases from adults ≥18 years of age, June 2019 – March 2020 (pre-pandemic period), Jun 2020 – March 2021 (pandemic period) and June 2021 – March 2022 (late-pandemic period)

	serotype	June 2019-March 2020	June 2019-March 2020 (%)	serotype	June 2020-March 2021	June 2020-March 2021 (%)	serotype	June 2021-March 2022	June 2021-March 2022 (%)
	Total	2331	100,0	Total	789	100,0	Total	1595	100,0
	PPV23	1682	72,2	PPV23	548	69,5	PPV23	1089	68,3
	PCV20	1510	64,8	PCV20	478	60,6	PCV20	978	61,3
	PCV15	898	38,5	PCV15	281	35,6	PCV15	642	40,3
	PCV13	676	29,0	PCV13	233	29,5	PCV13	558	35,0
	PCV10	131	5,6	PCV10	54	6,8	PCV10	110	6,9
	PCV7	125	5,4	PCV7	53	6,7	PCV7	104	6,5
1	3	434	18,6	3	148	18,8	3	357	22,4
2	8	350	15,0	8	131	16,6	8	194	12,2
3	22F	188	8,1	9N	48	6,1	19A	85	5,3
4	9N	126	5,4	22F	37	4,7	9N	79	5,0
5	12F	109	4,7	23A	30	3,8	23B	75	4,7
6	19A	98	4,2	23B	30	3,8	22F	73	4,6
7	23B	76	3,3	19A	28	3,5	4	66	4,1
8	23A	75	3,2	35F	25	3,2	11A	59	3,7
9	15A	66	2,8	11A	23	2,9	35F	54	3,4
10	10A	64	2,7	4	22	2,8	15A	50	3,1
11	11A	64	2,7	10A	22	2,8	23A	47	2,9
12	24F	59	2,5	15A	21	2,7	10A	41	2,6
13	4	57	2,4	16F	20	2,5	35B	39	2,4
14	35F	45	1,9	24F	19	2,4	6C	34	2,1
15	6C	43	1,8	35B	17	2,2	24F	31	1,9
16	38	37	1,6	12F	13	1,6	15B	28	1,8
17	16F	36	1,5	20	13	1,6	16F	25	1,6
18	35B	36	1,5	17F	12	1,5	31	24	1,5
19	33F	34	1,5	33F	11	1,4	7C	23	1,4
20	20	34	1,5	15C	11	1,4	19F	20	1,3
21	15C	34	1,5	19F	9	1,1	17F	19	1,2
22	19F	30	1,3	6C	9	1,1	20	19	1,2
23	15B	25	1,1	31	9	1,1	12F	14	0,9
24	17F	25	1,1	14	8	1,0	34	14	0,9

Tab. 2: Serotype ranking of IPD cases among adults ≥18 years of age, June 2019 – March 2020 (pre-pandemic period), Jun 2020 – March 2021 (pandemic period) and June 2021 – March 2022 (late-pandemic period)