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Supplementary Materials

Neuropsychiatric Features of Fregoli Syndrome:

An Individual Patient Meta-Analysis

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A: Table S1. PRISMA Guidelines checklist

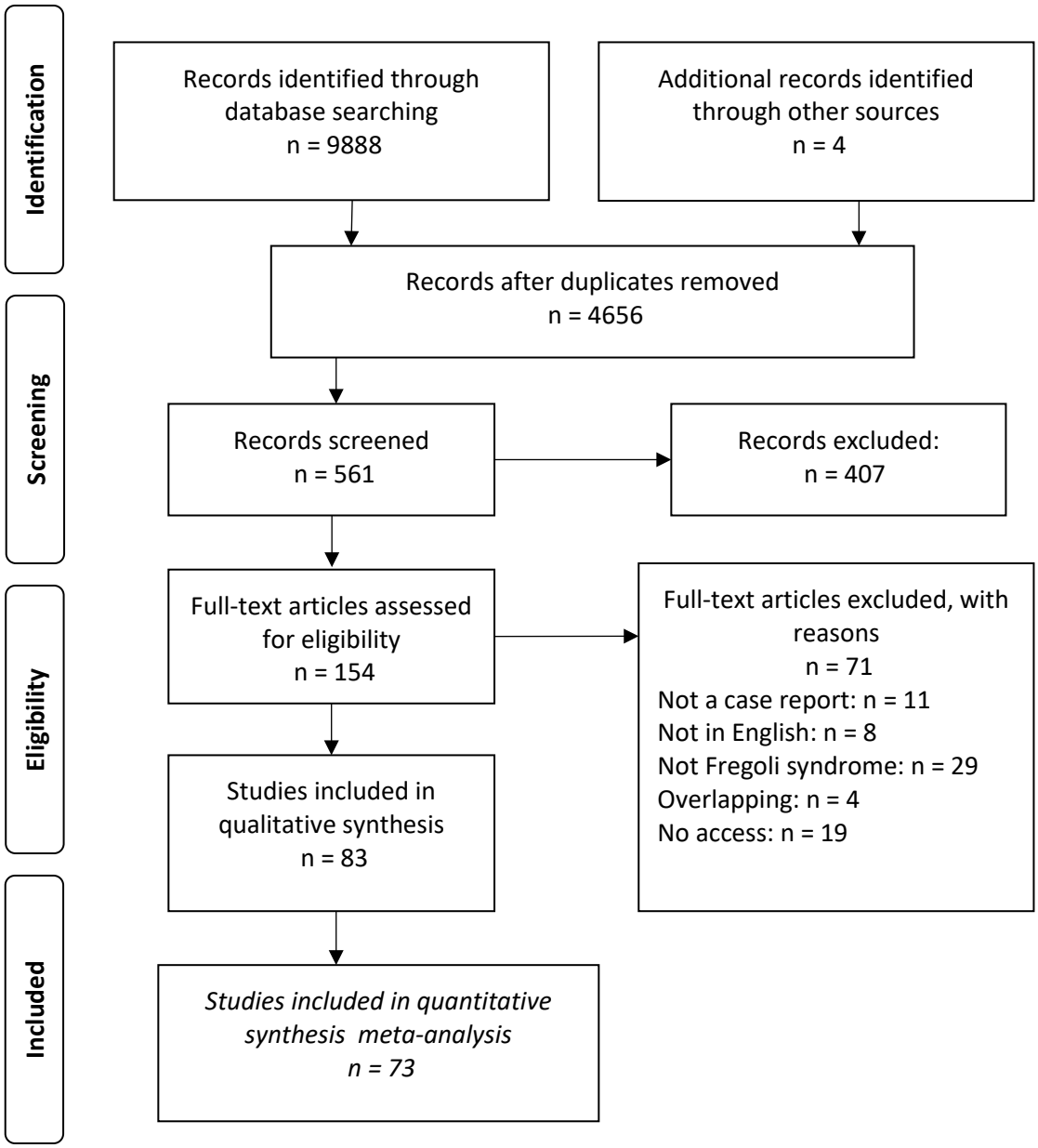
Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design PICOS .	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed e.g., Web address , and, if available, provide registration information including registration number.	5
Eligibility criteria	6	Specify study characteristics e.g., PICOS, length of follow-up and report characteristics e.g., years considered, language, publication status used as criteria for eligibility, giving rationale.	4
Information sources	7	Describe all information sources e.g., databases with dates of coverage, contact with study authors to identify additional studies in the search and date last searched.	4

Section/topic	#	Checklist item	Reported on page #
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	4
Study selection	9	State the process for selecting studies i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis .	4, 6
Data collection process	10	Describe method of data extraction from reports e.g., piloted forms, independently, in duplicate and any processes for obtaining and confirming data from investigators.	4 - 5
Data items	11	List and define all variables for which data were sought e.g., PICOS, funding sources and any assumptions and simplifications made.	4 - 5
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies including specification of whether this was done at the study or outcome level , and how this information is to be used in any data synthesis.	5
Summary measures	13	State the principal summary measures e.g., risk ratio, difference in means .	5
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency e.g., I^2 for each meta-analysis.	5
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence e.g., publication bias, selective reporting within studies .	4, Supp. Table 3
Additional analyses	16	Describe methods of additional analyses e.g., sensitivity or subgroup analyses, meta-regression , if done, indicating which were pre-specified.	5
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	6, Supp. Figure 1

Section/topic	#	Checklist item	Reported on page #
Study characteristics	18	For each study, present characteristics for which data were extracted e.g., study size, PICOS, follow-up period and provide the citations.	Supp. Table 4
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment see item 12 .	7, Supp. Table 4
Results of individual studies	20	For all outcomes considered benefits or harms , present, for each study: a simple summary data for each intervention group b effect estimates and confidence intervals, ideally with a forest plot.	7 - 8
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	7 Figure 2
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies see Item 15 .	7
Additional analysis	23	Give results of additional analyses, if done e.g., sensitivity or subgroup analyses, meta-regression [see Item 16] .	7 - 9
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups e.g., healthcare providers, users, and policy makers .	10 - 11
Limitations	25	Discuss limitations at study and outcome level e.g., risk of bias , and at review-level e.g., incomplete retrieval of identified research, reporting bias .	11 - 12
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	12

Section/topic	#	Checklist item	Reported on page #
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support e.g., supply of data ; role of funders for the systematic review.	13

B: Figure S1. PRISMA flowchart diagram



C: Table S2. Adapted version of the Diagnosis Certainty scale from Bell et al. 2017

Category	Description
Strongly	Fregoli is mentioned as a present delusion plus evidence of present or recent relevant delusional misidentification of people is described mention of people being replaced, or impostors, or lookalikes, or identical looking people, or clones, or robots etc .
Possibly	Fregoli is mentioned as a present delusion but no additional description of delusion content is given, or delusional nature is questioned, or the description is clearly not person misidentification.

D: Table S3. Methodological quality scale to assess cases' risk of bias Murad et al., 2018

Domain	Question	Yes	No	x
Ascertainment	Was the exposure adequately ascertained? - 4 or more clinical features have been described AND - There is information on content of delusion AND - Cause of psychosis can be determined			
	Was the outcome adequately ascertained? - Description of treatment modality AND - Description of treatment response			
Causality	Were other alternative causes that may explain the observation ruled out? - Neuroimaging investigations must be mentioned (MRI, EEG or CT) AND - Presence or not of abnormality must be clear			
	Was there a dose-response effect?			
	Was follow-up long enough for outcomes to occur?			
Reporting	Is the case described with sufficient details to allow other investigators to replicate the research or to allow practitioners make inferences related to their own practice?			
	Total Score:		-	-

Note:

x = Cannot be determined

E: Table S4: Frequencies of neuropsychiatric features in primary and secondary Fregoli syndromes

	Primary Psychosis Group (N = 34)		Secondary Psychosis Group (N = 55)		
	N reported	Total reported	N reported	Total reported	P-value
Investigation Findings					
Neuroimaging (CT/MRI)	4	21	19	23	< .01
Neurophysiological (EEG)	9	22	5	10	.63
Neuropsychiatric Domains					
Cognitive Impairment	21	27	21	21	.09
Restlessness and Agitation	22	23	14	16	.37
Depression and Anxiety	21	23	6	9	.11
Thought Disorder	20	21	7	8	.48
Sleep Problems	9	12	2	2	.71
Psychotic Features					
Persecutory Features	30	53	8	32	< .01
Multiple Fregoli Delusions	34	54	18	30	.79
Multiple Misidentification Delusions	19	51	7	22	.66
Co-occurring Delusions	42	51	19	22	.67
First-Episode Psychosis	8	30	12	15	< .01
Presence of Hallucinations	20	24	11	13	.92
Lack of Insight	21	21	14	16	.21
Response to Treatment					
Antipsychotics Exclusively	15	25	6	10	1.00
Other Treatments	10	12	6	8	.65

F: Table S5. Secondary Analyses: Lesion locations - Unadjusted p-values

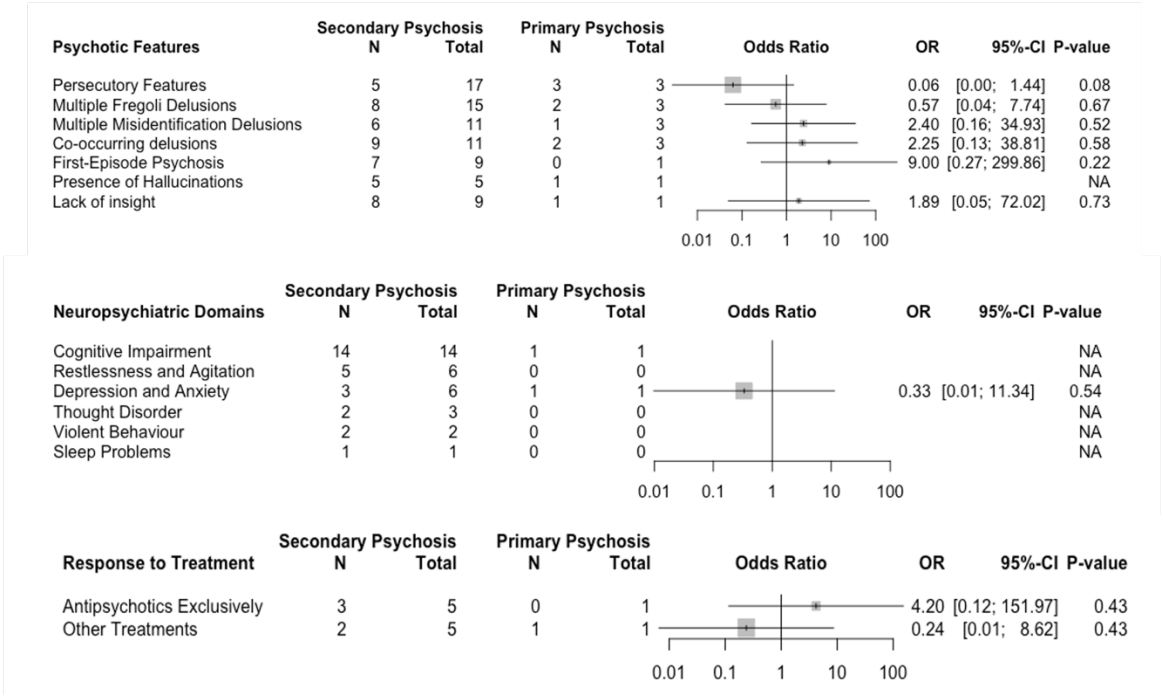
Lesion Locations	Total		Primary Psychosis N = 4		Secondary Psychosis N = 19		
	n (N = 23)	%	n (N = 4)	%	n (N = 19)	%	p-value
Right Side	15	65%	1	25%	14	74%	.09
Bilateral	9	39%	3	75%	6	32%	.14
Left Side	5	21%	0	0%	5	26%	.43
Frontal Lobe	12	52%	2	50%	10	53%	.92
Temporal Lobe	5	21%	3	75%	2	11%	.02
Temporoparietal	4	4%	0	0%	4	21%	.54
Frontoparietal	3	13%	0	0%	3	16%	.69

G: Table S6. Secondary Analyses: Fregoli delusion content – Unadjusted p-values

Delusion Content	Total [c] (N = 86)		Primary Psychosis (N = 52)		Secondary Psychosis (N = 34)		p-value
	n	%	n	%	n	%	
Person in the environment							
Hospital members and police	43	50%	23	44%	20	59%	.19
Strangers	25	29%	19	37%	6	18%	.06
Family members	19	22%	11	21%	8	24%	.80
Acquaintances [a]	10	12%	8	15%	2	6%	.20
TV characters	3	3%	2	4%	1	3%	.82
Identity perceived							
Family members	36	42%	14	27%	22	65%	.0007
Acquaintances [a]	25	29%	17	33%	8	24%	.36
Romantic interest [b]	13	15%	10	19%	3	9%	.20
Famous people	8	9%	7	13%	1	3%	.13
Person related to trauma	4	5%	3	6%	1	3%	.55

Note: [a] Acquaintances include neighbours, friends, school- and work-related people; [b] people with a romantic link also includes ex-partners; [c] Total number of cases that reported delusional content

H: Figure S2. Forest plot of the analysis of primary (n = 4) and secondary (n = 19) psychosis patients which reported neuroimaging results



I: Table S7. Cases of Fregoli syndrome included in the meta-analysis

Study	Type of article	Country	Patient's age	Patient's sex	Psychosis type	Cause of psychosis	Diagnosis Coherence	Risk of Bias
Abreu et al., 2019	Case report	Portugal	52	Male	Primary	Persistent Delusion Disorder	Strong	6
Ashraf et al., 2011	Case report	USA	54	Male	Primary	Schizophrenia	Strong	4
Atta et al., 2006	Case series (Case 1)	Unclear	59	Male	Primary	Bipolar Disorder	Strong	0
Atwal & Khan, 1987	Case report	USA	34	Male	Primary	Schizophrenia	Strong	2
Banov et al., 1993	Case report	USA	65	Female	Primary	Bipolar Disorder	Possible	1
Box et al., 1999	Case report	UK	27	Female	Secondary	Traumatic Brain Injury	Strong	5
Brown et al., 1996	Case report	USA	29	Female	Primary	Schizophrenia	Strong	0
Brüggemann & Garlipp, 2007	Case report	Germany	24	Female	Primary	Schizophrenia	Strong	3
Carter et al., 1995	Case report	UK	75	Male	Primary	Schizoaffective Disorder	Strong	2
Christodoulou, 1976	Case Series	Greece						

Study	Type of article	Country	Patient's age	Patient's sex	Psychosis type	Cause of psychosis	Diagnosis Coherence	Risk of Bias
	Case 1	Greece	23	Male	Secondary	Epilepsy	Strong	3
	Case 2	Greece	27	Male	Primary	Schizophrenia	Strong	1
	Case 3	Greece	26	Female	Primary	Schizophrenia	Strong	3
	Case 4	Greece	33	Male	Secondary	Systemic Illness	Strong	3
	Case 5	Greece	20	Male	Primary	Schizophrenia	Strong	3
	Case 6	Greece	17	Male	Primary	Schizophrenia	Strong	3
	Case 7	Greece	20	Male	Primary	Schizophrenia	Strong	3
Collacott & Napier, 1991	Case report	UK	42	Female	Primary	Psychotic Depression	Strong	4
De Bonis et al., 1994	Case report	France	20	Male	Primary	Not specified	Strong	1
De Pauw & Szulecka, 1988	Case series (Case 4)	UK	64	Male	Primary	Schizophrenia	Strong	2
De Pauw et al., 1987	Case report	UK	66	Female	Secondary	Stroke	Strong	4

Study	Type of article	Country	Patient's age	Patient's sex	Psychosis type	Cause of psychosis	Diagnosis Coherence	Risk of Bias
Delavenne & Garcia, 2011	Case report	France	30	Female	Primary	Schizophrenia	Strong	5
Devine et al., 2011	Abstract	UK						
			Not reported	Not reported	Secondary	Stroke	Strong	1
			Not reported	Not reported	Secondary	Stroke	Strong	1
do céu Ferreira et al., 2017	Case report	Portugal	77	Female	Secondary	Neurodegenerative	Strong	5
Duggal, 2004	Case report	USA	30	Female	Secondary	Epilepsy	Strong	4
Edelstyn et al., 2003	Experimental (Case 2)	UK	41	Male	Primary	Schizophrenia	Strong	1
Eva & Perry, 1993	Case report	New Zealand	19	Male	Secondary	Substance-related	Strong	5
Evans et al., 1982	Case report	USA	34	Female	Primary	Schizoaffective Disorder	Strong	2
Feinberg, 2001	Case series	Unclear						
	Case 5		54	Female	Secondary	Brain Tumour	Strong	1

Study	Type of article	Country	Patient's age	Patient's sex	Psychosis type	Cause of psychosis	Diagnosis Coherence	Risk of Bias
	Case 6		Unclear	Male	Secondary	Traumatic Brain Injury	Strong	1
Feinberg et al., 2005	Case report	USA	41	Male	Secondary	Stroke	Strong	1
Feinberg et al., 1999	Case report	USA	61	Male	Secondary	Traumatic Brain Injury	Strong	1
Francis et al., 2004	Case report	UK	20	Female	Secondary	Encephalitis	Strong	0
Granstein et al., 2015	Case report	Kuwait	15	Male	Secondary	Traumatic Brain Injury	Strong	5
Hermanowicz, 2018	Case series	USA						
	Case 1		84	Female	Secondary	Neurodegenerative	Strong	2
	Case 2		79	Male	Secondary	Neurodegenerative	Strong	2
Hintzen et al., 2010	Case report	Germany	22	Male	Primary	Schizophrenia	Strong	1
Hudson & Grace, 2000	Case report	Canada	71	Female	Secondary	Systemic Illness	Strong	2
Jocic & Stanton, 1993	Case report	USA	67	Male	Secondary	Stroke	Strong	2

Study	Type of article	Country	Patient's age	Patient's sex	Psychosis type	Cause of psychosis	Diagnosis Coherence	Risk of Bias
Joseph, 1985	Case report	USA	23	Male	Primary	Schizophrenia	Possible	0
Joseph, 1986	Case series	USA						
	Case 1		33	Female	Primary	Schizophrenia	Possible	1
	Case 2		31	Male	Primary	Schizophrenia	Possible	1
Kanzawa & Hadden, 2017	Case report	USA	23	Male	Primary	Psychotic Depression	Strong	0
Kochuparackal & Simon, 2012	Case report	Switzerland	21	Male	Primary	Schizophrenia	Strong	1
Kumar et al., 2018	Case report	India	43	Female	Primary	Schizophrenia	Strong	3
Lantos, 1988	Case report	Canada	33	Female	Primary	Psychotic Depression	Strong	1
Lykouras et al., 2001	Case report	Greece	36	Female	Primary	Schizophrenia	Strong	3
Lykouras et al., 2002	Case report	Greece	36	Female	Primary	Schizophrenia	Strong	6
Mann & Foreman, 1996	Case report	UK	19	Male	Primary	Schizophrenia	Possible	5

Study	Type of article	Country	Patient's age	Patient's sex	Psychosis type	Cause of psychosis	Diagnosis Coherence	Risk of Bias
Margariti & Kontaxakis, 2006	Case series	Greece						
	Case 1		19	Female	Primary	Schizophrenia	Strong	3
	Case 2		26	Male	Primary	Schizophrenia	Possible	3
McEvedy et al., 1996	Case report	UK	38	Female	Primary	Bipolar Disorder	Possible	4
Melca et al., 2013	Case series (Case 2)	Unclear	30	Male	Primary	Obsessive Compulsive Disorder	Possible	0
Moriyama et al., 2007	Case report	Japan	68	Female	Secondary	Stroke	Strong	5
Mulholland & O'Hara, 1999	Case report	UK	44	Male	Primary	Schizoaffective Disorder	Strong	2
Naguy & Al-Tajali, 2015	Case report	USA	40	Female	Primary	Bipolar Disorder	Strong	5
Narayanaswamy et al., 2012	Case Report	India	40	Female	Primary	Schizophrenia	Strong	4
Nejad & Kheradmand, 2009	Case report	Iran	22	Male	Primary	Bipolar Disorder	Possible	6
Nishio & Mori, 2012	Case report	Japan	69	Male	Secondary	Stroke	Strong	2

Study	Type of article	Country	Patient's age	Patient's sex	Psychosis type	Cause of psychosis	Diagnosis Coherence	Risk of Bias
Novakovic et al., 2010	Case report	USA	45	Female	Primary	Schizophrenia	Strong	2
O'Sullivan & Dean, 1991	Case series	UK						
	Case 1		23	Female	Primary	Schizoaffective Disorder	Strong	3
	Case 2		30	Female	Primary	Bipolar Disorder	Strong	3
	Case 3		27	Female	Primary	Unspecified Functional Psychosis	Strong	4
	Case 4		28	Female	Primary	Unspecified Functional Psychosis	Strong	4
Oyebode et al., 1998	Case series	UK						
	Case 2		43	Male	Primary	Schizophrenia	Strong	0
	Case 3		31	Male	Primary	Schizophrenia	Strong	0
	Case 4		37	Female	Primary	Psychotic Depression	Strong	0
Ranjan et al., 2007	Case report	unclear	25	Female	Primary	Schizophrenia	Strong	3

Study	Type of article	Country	Patient's age	Patient's sex	Psychosis type	Cause of psychosis	Diagnosis Coherence	Risk of Bias
Rodrigues & Banzato, 2006	Case report	Brazil	22	Male	Secondary	Substance-related	Strong	4
Ruff & Volpe, 1981	Case report	USA	60	Female	Secondary	Traumatic Brain Injury	Strong	1
Sakurai et al., 2012	Case report	Japan	60	Female	Secondary	Epilepsy	Strong	5
Salviati et al., 2014	Case report	Italy	61	Female	Secondary	Systemic Illness	Strong	4
Sami et al., 2015	Case report	UK	34	Male	Secondary	Traumatic Brain Injury	Strong	4
Sanati & Mojtabai, 1993	Case report	Unclear	51	Female	Primary	Psychotic Depression	Strong	4
Silva et al., 1997	Case series (Case 3)	USA	40	Male	Primary	Bipolar Disorder	Possible	3
Silva & Leong, 1992	Case report	USA	41	Male	Primary	Schizophrenia	Strong	2
Silva et al., 1995	Case series (Case 1)	USA	34	Male	Primary	Schizophrenia	Strong	3
Silva et al., 1992	Case series (Case 2)	USA	43	Male	Primary	Schizophrenia	Strong	1
Singh et al., 2014	Case report	India	23	Female	Secondary	Systemic Illness	Strong	4

Study	Type of article	Country	Patient's age	Patient's sex	Psychosis type	Cause of psychosis	Diagnosis Coherence	Risk of Bias
Stewart, 2008	Case report	USA	57	Male	Secondary	Substance-related	Strong	2
Tanabe et al., 2018	Case report	Japan	61	Male	Secondary	Stroke	Strong	1
Teo et al., 2017	Case report	Singapore	41	Female	Primary	Folie à Deux	Strong	3
Turkiewicz et al., 2009	Case report	Brazil	62	Female	Secondary	Neurodegenerative	Strong	1
Uga & Ibilah, 2019	Abstract	USA	67	Female	Secondary	Neurodegenerative	Strong	1
Ulzen, 1995	Case report	Canada	50	Male	Secondary	Traumatic Brain Injury	Strong	1
Vecellio et al., 2003	Case series (Case 2)	Switzerland	23	Female	Secondary	Substance-related	Strong	2
Wright et al., 1993	Case report	UK	35	Female	Primary	Schizophrenia	Strong	2
Yalin et al., 2008	Case report	Turkey	14	Female	Primary	Not specified	Strong	4
Young et al., 1991	Experimental (Case 1)	UK	67	Male	Secondary	Stroke	Strong	0

J: References of eligible cases of Fregoli syndrome

i) Included in the meta-analysis

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