SAS Journal of Medicine
Abbreviated Key Title: SAS J Med
ISSN 2454-5112
Journal homepage: https://saspublishers.com

OPEN ACCESS

Medicine and Pharmacy

Morphological Abnormalities in Schizophrenia: Systematic Review

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DOI: 10.36347/sasjm.2022.v08i05.005 | **Received:** 27.03.2022 | **Accepted:** 04.05.2022 | **Published:** 23.05.2022

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Abstract **Review Article**

Schizophrenia is a severe, frequent, heterogeneous, longlasting and disabling chronic mental illness with high social impact, belonging to the group of chronic psychoses. There are several clinical forms and several possible evolutionary modes. Its etiopathogenesis is multifactorial (hereditary, biological, environmental, etc.) but no single cause has been demonstrated up till now. Schizophrenia is a group of disabling heterogeneous disorders that are generally severe, the course of which is chronic and disabling, and the prognosis is poor. Many retrospective studies have attempted to trace the premorbid history of adult subjects who developed schizophrenia. Their results appear to be extremely disparate, due in particular to the heterogeneity of the means of investigation used. In addition, in recent years, many studies have focused on prodromal symptoms occurring during the year preceding the first psychotic episode in late adolescence or early adulthood. Minor physical cranio-cerebral (at the level of the ears, the palate, the cranial perimeter), temporomandibular, dental and palatal abnormalities, dermatoglyphic disturbances or even subtle neurological signs have been frequently found in schizophrenic patients, in particular oral anomalies, more precisely the measurements of the teeth, their vestibulo-lingual and mesio-distal diameters. The objective of our article is to study the morphological abnormalities that exist in the patient with schizophrenia, and to demonstrate whether there is a link between the presence of these physical abnormalities and the occurrence of schizophrenia. This issue has been vaguely mentioned in the literature, but in the Moroccan context, it is a pilot study.

Keywords: Schizophrenia - physical abnormalities - measurements - teeth – screening.

INTRODUCTION

Schizophrenia is a complex psychiatric illness characterized by a highly variable set of symptoms. It is a severe and chronic mental disorder that affects 23 million people worldwide, or about 1% of the world's population [10]. It occurs in all regions of the world but seems more frequent in urban areas and among migrants.

Its diagnosis is based on the criteria of the DSM 5 (5th version of the diagnostic and statistical manual of mental disorders): Characteristic symptoms: Two (or more) of the following manifestations are present, each for a significant part of the time during a period of 1 month (or less when responding favorably to treatment): (1) delusions (2) hallucinations (3) disorganized speech (i.e., frequent rambling or incoherence) (4) rude behavior disorganized or catatonic (5) negative symptoms, for example: emotional blunting, alogy, or loss of will [1].

The average age of onset of the first psychotic episode of schizophrenia is between the beginning and the middle of the 3rd decade in men and towards the end of the 3rd decade in women. Onset may be abrupt or insidious, but the majority of individuals exhibit some form of prodromal phase manifested by the slow and gradual development of various signs and symptoms (e.g. social withdrawal, loss (interest in school or work, deterioration of hygiene and presentation, unusual behavior, outbursts of anger) [1, 13].

According to the World Health Organization, schizophrenia is the eighth cause of disability in subjects aged between 15 and 44 years. It represents a heavy burden for patients, their relatives, the health

system, the social and medico-social system and society in general [23].

Although several hypotheses attempt to explain the occurrence of schizophrenia, its etiopathogenesis remains unknown.

Schizophrenia is a pathology whose clinical expression is complex and whose etiological factors seem multiple. The integration of different data from all the etiopathogenic hypotheses making it possible to account for the phenomena observed in schizophrenia within a so-called integrative model is one of the most promising research avenues currently [8, 1].

The risk of premature mortality (before the age of 65) in patients suffering from schizophrenia is 2 to 3 times higher than that observed in the general population, the life expectancy of a schizophrenic patient being in average reduced by 20% [23].

The first cause of this excess mortality is suicide with a rate estimated between 10 and 20% and a life expectancy lowered by about 10 years [23]. In addition, other causes of mortality (accidental causes, medical causes) are also overrepresented in schizophrenic patients. This is particularly the case for cardiovascular and respiratory diseases [16].

The impact and consequences of the disease are marked by

- A functional disability: lack of personal autonomy and professional activity.
- Excess mortality: high suicide rate, and high frequency of somatic respiratory, cardiovascular and infectious pathologies.
- "Post-psychotic depression" occurring after an episode of treated delirium.
- Addictive behavior: attempt at self-medication.
- Passages to the medico-legal act on the occasion of a delirium with strong thymic participation and an unshakable delusional conviction, can occur (aggression, murder, disturbances of Public Order)

Explanatory theories of schizophrenia

1. Neurodevelopmental hypothesis: based on numerous works which have observed: the increase in the volume of the cerebral ventricles, the loss of substance at the level of the superior temporal gyrus, and a progressive neurodevelopmental process.

2. Neurobiological hypotheses

The dopaminergic hypothesis: hyperdopaminergy would be linked to hypofrontality. The involvement of the serotonergic, noradrenergic, glutamatergic, gabaergic and neuropeptide systems is discussed.

The pathophysiological role of the mesocorticolimbic system: structures such as the frontal cortex, the basal ganglia and the amygdala are involved.

3. Psychosocial factors

Appear as precipitating factors: trauma, stress, life events.

4. Genetic factors

The work carried out (family aggregation, twins, etc.) has confirmed the existence of a genetic component, the modes of transmission, however, are still poorly understood. Many candidate genes have been studied, in particular the alleles of the HLA system. Certain genes have been identified as risk factors.

5. Schizophrenia and Cannabis

The increased risk of onset of schizophrenia in cannabis users could indicate, on the one hand, that cannabis use may constitute a marker of development and, on the other hand, that future schizophrenic subjects have a greater propensity important to use cannabis.

6. Other hypotheses: early exposure to various factors: exposure to infectious agents of the disease during the gestational period, the role of advanced maternal age, hypovitaminosis D.

7. On the immunological level, a decrease in the number and reactivity of lymphocytes, an increase in the level of anti-brain cell antibodies and a decrease in the level of interleukin 2 were found.

8. Neurocognitive and electroneurophysiological abnormalities:

- Abnormalities in the pursuit of eye movements
- Cognitive abnormalities – specific EEG abnormalities
- Auditory evoked potential abnormalities

9. Data from brain neuroimaging work: which highlights variable and multiple brain anatomical and functional abnormalities:

Hypofrontality, dysfunction of the anterior angular region, asymmetry of the right and left temporal sulci, and change in gray matter volume more marked in childhood-onset schizophrenia, dysmaturation of the association cortex and corticolimbic pathways.

Relationship between neurodevelopmental theory and schizophrenia

Studies show an increased frequency of early motor, cognitive and emotional disturbances, with data often coming from retrospective studies, from information provided by parents or from school results [10].

We have thus described very early motor coordination disorders, walking delay, language delay and language disorders, identifiable between the ages of 2 and 15, tendencies towards isolation, solitary games, social anxiety and relationship difficulties. These disturbances differ according to sex, with more "characteristic" disturbances in boys, and more marked affective numbing or emotional withdrawal in girls.

A decline in intellectual functions from 4 to 7 years and then a stable decline has also been described in future schizophrenics, compared to controls. There has been considerable discussion about a possible decrease in IQ in patients with schizophrenia over the course of the disease, which seems to be contradicted by a number of recent studies, except perhaps in the most hebephrenic forms, which Kraepelin described early dementia [22].

Motor and language disturbances are greater and more frequent in the very early onset forms of schizophrenia (COS, or Childhood On set Schizophrenia): only 15% of these very early forms have no disturbances in this area, compared to 70% in other forms of schizophrenia [21].

There is also an increased prevalence of minor craniocerebral physical abnormalities (in the ears, the palate, and the cranial perimeter), disturbances of the dermatoglyphs or even subtle neurological signs, which can reflect neurodevelopmental disturbances [10, 32, 7].

The difficulties in interpreting these various clinical abnormalities are linked to the fact that they are modest and not very predictive (only 15% of children who later develop schizophrenia have such abnormalities). They are also non-specific, since they are also found in subjects who later present with bipolar disorders. Finally, their prevalence is low: only one third of subjects suffering from schizophrenia presented such premorbid abnormalities during childhood [1].

There is also an increased frequency of non-specific psychopathological disorders before the onset of schizophrenia or schizophreniform disorder.

During a study carried out from the New Zealand cohort of Dunedin, the final evaluation at an age of 26 years, showed a rate of 53% of patients who already presented disorders at 15 years of age (non-specific disorders of type anxiety, depression, attention deficit disorder, conduct disorder, etc.), and a rate of 15% of patients who had already had delusional or hallucinatory experiences at the age of 11; Finally, the greater the early delusional symptomatology, the higher the risk of progression to schizophrenia or schizophreniform disorder [24].

Morphological abnormalities present in subjects with schizophrenia

Minor physical abnormalities include a range of subtle alterations in the development of physical structures found in the skull, hair, face, hands and feet. They can be considered either as variants of the normal or as a major indicator of a congenital anomaly.

Both the brain and the face develop from the common embryonic ectoderm at the beginning or end of the second trimester and their morphogenesis is interconnected (Diewert and Lozanoff, 1993).

Minor physical anomalies therefore act as biological markers of a developmental disorder over time in comparison with the normal chronological development of the embryo (Tarrant and Jones, 1999).

The majority of published studies rely on the application of the scale designed by Waldrop et al in 1968. This scale was originally designed for use in the case of children with Down syndrome.

The Waldrop Scale identified nine minor physical abnormalities that were significantly different between schizophrenic subjects and their controls. (Gualtieri *et al*., 1982; Guy *et al.,* 1983; Green *et al*., 1994; O'Callaghan *et al*., 1991; Lohr and Flynn, 1993).

Individuals with schizophrenia had an increased prevalence of fine electric hair, abnormal circumference of the head, epicanthus, hypertelorism, low set ears, adherent earlobes, thick palate, curved fifth finger, and third toe larger than or equal to second toe.

Minor physical abnormalities have been found to be more frequent in several neurodevelopmental disorders such as learning disabilities (Alexander *et al*., 1992), speech and hearing disorders of congenital origin, attention deficit disorder and hyperactivity (Firestone and Peters, 1983; Krouse and Kauffman, 1982), autism (Smalley *et al.,* 1988), fetal alcohol syndrome (AuttiRamo *et al*., 1992) and cerebral palsy (Illingworth , 1979) [4].

The frequencies of minor physical abnormalities in patients with alcoholism (Gualtieri *et al*., 1982), mood disorders (Lohr and Flynn, 1993), schizoaffective disorder and schizophrenia (McGrath *et al*., 1995) have also been studied and shown contradictory results [5].

Several studies report that minor physical abnormalities are significantly more common in schizophrenia than in controls (Gualtieri *et al*. 1982; Guy *et al*., 1983; Green *et al.,* 1994; O'Callaghan *et al*., 1991; Lohr and Flynn, 1993), thus supporting a neurodevelopmental etiology for this disorder (Murray *et al*., 1992).

Two studies did not find an increased frequency of minor physical abnormalities in schizophrenia (Sigmundsson *et al*., 1996; Alexander *et al*., 1994). The results of the first studies are very disparate.

Few studies reported specific abnormalities, but those that did found that there were always palate abnormalities [26]. (Green *et al.,* 1994; O'Callaghan *et al*., 1991; Lohr and Flynn, 1993.

In table (1), it is deduced that the oral cavity has the largest oddsratio followed by the skull, eyes, feet, hands and then ears. This means that oral anomalies are the most frequent among the minor physical anomalies found in schizophrenia [19, 3].

We will review neurological, craniofacial, ear, scalp and other less common morphological anomalies but we will focus our work on dental anomalies.

a- Dental and palatal abnormalities

The shape of the palate is determined during the sixth to ninth weeks of gestation and its postnatal morphology is established during the 16th and 17th weeks. This follows a complex process associated with a craniofacial growth process, which must occur within a critical time frame (Cohen *et al*., 1993; Sperber, 1992; Diewert and Lozanoff, 1993) [25].

While it is assumed that differences in palate shape are more likely to be environmentally determined, as opposed to neurodevelopmentally determined, it remains unclear whether such a factor could also affect people with or without mental illness.

In order to identify the role that the environmental factor could play, it should be noted that 64% of the elderly wore dentures or lost or had all their teeth extracted.

During palate development, the growth of alveolar bone in response to dental eruption deepens the shape of the palate. Thus, it becomes tall and narrow. It is stimulated to grow by the presence of teeth, maintaining the height of the palate. In the absence of teeth, it is resorbed (Osbourne, 1998).

The loss or extraction of teeth in the elderly followed by a long duration, by the pressure due to the wear of the dental prostheses can lead to the observation of a shortening and a widening of the shape of the palate.

A lack of oral hygiene and a lack of subsequent care affect the teeth in people with schizophrenia, which could be responsible for tooth loss from an early age.

The mentally ill, especially schizophrenics, are a risk group for periodontal disease. Psychiatric factors may affect the etiopathogenesis of these periodontal disorders.

Dental hygiene is usually poor, and the occurrence of plaque and limescale is common. The plaque is more aggressive and adhesive, if associated with xerostomia and smoking.

The results of a study conducted in Venezuela published in 2014 showed that 29.23% of the patients had gingivitis, 56.92% had periodontitis and only 13.84% of the sample showed no signs of periodontal disorder.

It is important to note that 78.46% of patients were on anticonvulsants, which represents a risk factor for the development of periodontal disease.

The study by Gurbuz *et al*. conducted in Turkey, out of 330 hospitalized patients with mental illness whose psychiatric disorders were assessed, found that only 8.8% of patients had healthy periodontal tissue. 6.3% presented gingival hemorrhage, 51.8% of subjects had calcareous and 33% deep periodontal bags.

Jovanovic *et al*. conducted a study of 186 psychiatric patients, and 186 controls in Serbia, and determined that 3.3% had gingival hemorrhage, 15% dental plaques and 28.3% deep sacs. Only 8.3% showed no signs of periodontal disease.

Another study conducted by Eltas *et al*. [7], on 53 psychiatric patients, under a treatment which has as a side effect xerostomia or sialorrhea, concluded that there is a high risk of developing periodontal disease in schizophrenic patients, and that such a risk is still higher [5, 26].

In patients taking a drug that causes a decrease in the flow of saliva. In terms of caries index, 56.92% of the sample had caries, and 43.08% had no such lesions.

Similar indices were obtained by Patel *et al*. [10], after evaluating 112 patients with mental illness, and determined that 53% of them had caries in at least one of the teeth.

Similarly, Kossioni *et al*. [12], after studying a sample of 11 patients hospitalized in the psychiatric department, determined that 50.7% of them had at least one caries [31].

Thomas *et al*. conducted a study in 1996 whose results showed a positive correlation between negative symptoms and poor dental hygiene, as well as an increased need for periodontal treatment.

This study also showed that found a direct relationship between longevity of stay, presence of negative symptomatology and poor dental health.

This suggests that the presence of negative symptoms of schizophrenia can often be associated with poor dental health.

Therefore, it is important to educate schizophrenic patients and their loved ones in order to improve self-care competence and achieve good dental health, and subsequently, better overall health, quality of life, and self-esteem.

Waddington *et al*. (1998) followed a cohort of 88 patients over a 10-year period to look for predictors of survival in this group. Older age, male sex and edentulism were associated with reduced survival.

The prevalence of edentulism in the sample was 38%, suggesting that premature tooth loss in subjects with schizophrenia may be higher. Patients with schizophrenia had a significantly wider palate than matched control subjects [25, 9].

As shown in Table (2), researchers also found a wider range of tooth and mandible abnormalities in patients with schizophrenia than in the control group [17]. The prevalence of edentulism in the sample was 38%, suggesting that premature tooth loss in subjects with schizophrenia may be higher.

Patients with schizophrenia had a significantly wider palate than matched control subjects [25, 9]. As shown in Table (2), researchers also found a wider range of tooth and mandible abnormalities in patients with schizophrenia than in the control group [17].

According to the authors, all these abnormalities can be explained by lifestyle differences and drug intake [11]. A family study found an association between cleft palate and broadening of the spectrum of schizophrenia (Gourion *et al*., 2004). Table (3) (4)

With ongoing studies and research, it is possible that the teeth and palate may serve as markers of early abnormalities in the future and help determine when prodromal signs of schizophrenia begin, and serve as a marker temporal in all subgroups of schizophrenia [11, 17].

b- Temporomandibular abnormalities

The importance of psychiatric disorders associated with temporomandibular abnormalities has been mentioned in several studies.

In the literature, studies find a relationship between the appearance, clinical, prognosis and treatment of temporomandibular anomalies and psychosocial factors, such as stress, anxiety and depression.

In terms of temporomandibular joint, 36.92% showed some joint noise [27]. Velasco-Ortega *et al.* studied a sample of 50 schizophrenic patients, and 50 controls, and determined that 24% of schizophrenic patients presented with joint sounds.

In this study, 26.15% of the sample showed deviation in the mandible, opening or closing, and 10.76% reported muscle pain on palpation. Most clinical studies show a greater occurrence of temporomandibular disorders than in healthy patients.

c- Craniofacial abnormalities

Schizophrenia has also been associated with hypertelorism or widely spaced eyes. Given the anatomy of the skull, hypertelorism should generally be associated with a wide palate (Boyes *et al*., 2001; Elizarraras-Rivas *et al*., 2003)[4].

Abnormalities in the midline structures of the brain—Corpus callosum (corpus callosum), interthalamic adhesion, and septum pellucidum—have also been found in schizophrenia [14, 29].

The consequences on these structures are consistent with a widening midline in the head and brain, although these changes may be secondary to other neurodevelopmental problems (Rajarethinam *et al.*, 2001; Snyder *et al*., 1998; Kirkpatrick *et al*., 1997; Narr *et al*., 2000; DeQuardo *et al*., 1996; Casanova *et al*., 1990) [8, 30].

An abnormality in the left temporal lobe in has been associated with subclinical cleft lip and palate abnormality. (Nopoulos *et al*., 2001,2002).

The palate is part of a bony structure that includes the bones on which the base of the temporal lobe rests (Diewert *et al*., 1993) [6].

Benefit of early diagnosis

Currently, research as well as the psychiatric clinic is constantly evolving and an increasing number of studies are interested in the beginning phases of schizophrenia. This interest stems from new etiopathogenic conceptions such as the neurodevelopmental hypothesis.

Current research is aimed at defining prevention targets and increasing the effectiveness of care, which would in particular make it possible to reduce the deficient evolutions of the disease, improve the functional prognosis (social relations, professional integration) and possibly reduce the disease incidence.

The need to treat first episodes promptly with antipsychotics is now well established. A long “duration

of untreated psychosis" is a factor of poor prognosis. It corresponds to the duration between the appearance of the first frank psychotic symptoms and the initiation of treatment. It was evaluated in a French study at approximately 2 years [18, 28].

The delay in setting up an appropriate treatment can have major consequences on the future of the subject. Numerous studies show a relationship between a prolonged duration of untreated psychosis and a poor prognosis [20, 28, 15]. In case of therapeutic intervention too late (duration of untreated psychosis prolonged), are noted in patients:

- More resistance to antipsychotic treatments and more relapses;
- Slower and less complete remissions of decompensation of the disease;
- Faster and more marked cognitive decline;
- A higher risk of depression and substance abuse;
- More severe behavioral and social disruptions.

The meta-analysis by Perkins *et al*. covering 43 studies of subjects included during a first psychotic episode confirms a correlation between a short duration of prolonged untreated psychosis and better efficacy of antipsychotics [18], but also between a long duration of prolonged untreated psychosis and a negative symptomatology and the cognitive impact of the disease [22].

The review of the literature by Marshall *et al*. centered on 26 prospective studies including 4490 subjects during a first psychotic episode, finds a correlation between the duration of prolonged untreated psychosis and the outcome at 6 and 12 months in terms of social and global outcome [2, 27].

Perceptual

At present, no study in this perspective has been carried out in our Moroccan context, hence the interest of carrying out this project in Moroccan patients with schizophrenia.

Indeed, we are in the process of carrying out a case-control type study which aims to compare the coronal dental dimensions in two populations: a group of subjects with schizophrenia and a control group recruited from the Ar- Razi in Salé and the orthodontic department of the dental consultation and treatment center of the Ibn Sina university hospital center in Rabat, Morocco.

Table-1: Different physical abnormalities present in schizophrenic subjects

Results for studies reporting MPA frequencies by anatomical region

Study	OR (95%CI) by region[a, b]					
	Head	Eyes	Ears	Mouth	Hands	Feet
Green et al. (1989)	**2.35 (1.05–5.23)**	0.98 (0.48–2.00)	**22.87 (1.32–397.58)**	**13.49 (5.64–32.26)**	**5.02 (1.61–15.61)**	1.83 (0.91–3.68)
McGrath et al. (1995)	–	6.18 (0.31–121.75)	0.71 (0.37–1.36)	0.69 (0.34–1.37)	**5.92 (1.31–26.71)**	**5.38 (1.21–23.94)**
Ismail et al. (1998)	**3.33 (2.05–5.42)**	**4.41 (2.32–8.39)**	**2.00 (1.34–2.98)**	**3.64 (2.20–6.02)**	**2.06 (1.35–3.14)**	1.44 (0.88–2.37)
Lawrie et al. (2001)	1.56 (0.56–4.36)	**3.32 (1.32–8.34)**	0.88 (0.54–1.44)	0.85 (0.41–1.78)	0.54 (0.19–1.53)	1.97 (0.81–4.78)
Hata et al. (2003a)	1.86 (0.97–3.55)	1.46 (0.90–2.37)	1.92 (0.99–3.74)	**4.83 (1.78–13.12)**	1.60 (0.81–3.13)	1.41 (0.66–3.00)
Sivkov and Akabeliev (2003)	**2.23 (1.42–3.49)**	**2.57 (1.35–4.88)**	1.36 (0.98–1.88)	**2.50 (1.61–3.89)**	1.31 (0.73–2.36)	**11.80 (3.54–39.32)**
Gourion et al. (2004a)	**3.09 (1.92–4.97)**	**13.34 (1.72–103.57)**	**1.80 (1.08–2.99)**	**3.20 (1.52–6.73)**	**4.84 (2.45–9.53)**	1.81 (0.94–3.51)
Pooled effect size[c]	**2.55 (2.02–3.21)**	**2.47 (1.45–4.21)**	**1.42 (1.01–2.00)**	**2.65 (1.38–5.10)**	**2.14 (1.28–3.58)**	**2.15 (1.38–3.35)**
Within-region heterogeneity (Q)	3.984	16.705**	16.192*	40.474***	19.555**	12.978*

Bold figures indicate OR significant at least at the 0.05 level.
*$p \leq 0.05$, **$p \leq 0.01$, ***$p \leq 0.001$.
[a] An OR >1 indicates increased MPA frequency in the schizophrenic group.
[b] Mantel–Haenszel method used for calculating OR.
[c] Random effects model used to estimate pooled effect size.

Table-2: showing the various abnormalities identified in schizophrenic patients in comparison with healthy subjects

Abnormalities in the teeth of schizophrenia and control subjects

	Schizophrenia (N=28), %	Control subjects (N=25), %	p value
Diastema[a]	61	16	
Rotated teeth	18	4	
Crowding	68	20	
Peg-shaped lateral incisors	7	0	
Misfit, maxillary and mandibular arches	11	0	

[a] A space between two adjacent teeth in the same dental arch.

Table-3: Showing the different anomalies of the palate in schizophrenic patients

Results of univariate and multivariate statistical analysis.

	UNIVARIATE				MULTIVARIATE			
	p	B	95,0% C. I.		p	B	95,0% C. I.	
			Lower	Upper			Lower	Upper
Age(> 35)	[b]0.530	0.854	0.522	1.398				
Gender(Male/Female)	[b]1.000	1.000	0.611	1.636	0.073	1.686	0.953	2.981
Palate width	[a]0.011*	1.106	1.023	1.196	0.005**	1.161	1.047	1.288
Palate length	[a]0.081	1.073	0.991	1.161				
Palate depth	[a]0.046*	1.125	1.001	1.264				
Maxillary arch form								
Normal or parabolic	[b]0.014*							
Ellipsoid	[b]0.001**	2.753	1.479	5.124	0.047*	1.915	1.008	3.638
U-shaped or hypsiloid	[b]0.384	1.361	0.680	2.725				
Pointed or hyperbolic	[b]0.158	1.800	0.796	4.071				
Palate shape								
Normal or round	[b]0.001**				0.000***			
Furrowed	[b]0.001**	3.493	1.776	6.870	0.000***	6.777	3.055	15.034
Shelf-like or stair	[b]0.229	1.510	0.772	2.954	0.102	1.819	0.889	3.725

* $p < 0.05$.
** $p < 0.01$.
*** $p < .001$.
[a] Independent Samples T test.
[b] Pearson chi square test.

Table-4: comparison of palatal parameters between healthy subjects and schizophrenic patients

Comparison of age and palatal parameters betweeen schizophrenic patients and normal controls by gender.

	Male (n=130)		Female (n=124)		Statistical Significance (p)			
	Schizophrenia	Controls	Schizophrenia	Controls	(1)(2)	(3)(4)	(1)(3)	(2)(4)
	(N=65)(1)	(N=65)(2)	(N=62)(3)	(N=62)(4)				
Age *(m±sd)*	33.23 ± 6.24	33.88 ± 5.90	34.76 ± 6.62	34.26 ± 6.01	[a]0.545	[a]0.402	[a]0.092	[a]0.719
Palate width *(m±sd)*	35.87 ± 3.61	34.71 ± 2.72	33.81 ±3.16	33.34 ± 2.90	[a]0.041*	[a]0.402	[a]0.011*	[a]0.007**
Palate length *(m±sd)*	35.00 ± 2.95	34.15 ± 2.87	32.72 ± 3.13	32.45 ± 3.34	[a]0.097	[a]0.351	[a]0.000***	[a]0.003**
Palate depth *(m±sd)*	22.73 ± 2.42	22.30 ± 2.04	21.17 ± 1.80	20.82 ± 1.71	[a]0.276	[a] 0.047*	[a]0.002**	[a]0.000***
Maxillary arch form *n(%)*					[b]0.474	[b]0.008**	[b]0.996	[b]0.070
Normal or parabolic	17 (26.2)	20 (30.8)	17 (27.4)	34 (54.8)	> .05	[c]0.004**	> .05	> .05
Ellipsoid	27 (41.5)	19 (29.2)	25 (40.3)	11 (17.7)	> .05	[c]0.010*	> .05	> .05
U-shaped or hypsiloid	12 (18.5)	17 (26.2)	12 (19.4)	11 (17.7)	> .05	[c]1.000	> .05	> .05
Pointed or hyperbolic	9 (13.8)	9 (13.8)	8 (12.9)	6 (9.7)	> .05	[c]0.777	> .05	> .05
Palate shape *n(%)*					[b]0.001**	[b]0.112	[b]0.008**	[b]0.008**
Normal or round	26 (40.0)	49 (75.4)	40 (64.5)	42 (67.7)	[c]0.001**	> .05	[c]0.006**	[c]0.148
Furrowed	27 (41.5)	11 (16 > 9)	11 (17.7)	4 (6.5)	[c]0.004**	> .05	[c]0.015*	[c]0.009**
Shelf-like or stair	12 (18.5)	5 (7.7)	11 (17.7)	16 (25.8)	[c]0.119	> .05	[c]0.127	[c]0.007**

[a] Independent Samples *T* test.
[b] Pearson Ki-Kare Test.
[c] Yates' Continuity Correction Test.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

CONCLUSION

The value of identification and management in the early stages of the disease appears clear. It is a question of establishing a treatment making it possible to reduce the intensity of the disorders and to reduce the social consequences of the disease.

Further studies with a larger sample are needed to establish a link between the presence of morphological abnormalities, even minor ones, and the emergence of schizophrenia, or even detect it at a short diagnostic time.

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