

*Type of the Paper (Research Article)*

## microRNA-29 expression in patients with Nasal polypi

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### Abstract:

**Introduction:** In the ENT outpatient clinic, sinus polypus is a usual clinical condition. Complaints include sinus blockage, smell issues, anterior or posterior nasal discharge, and/or continuous facial discomfort extending more than twelve weeks in duration. nasal polyps originate usually from the ethmoid sinuses and expand into the nasal passageway. A category of non-coding RNAs is referred to as microRNAs (miRNAs). They have an impact on the regulation of how genes are expressed. In specific instances, microRNAs have the power to regulate transcription and initiate translation.

**Aim of the study:** To observe microRNA-29 expression in patients with sinus polypi.

**Subjects and Methods:** One hundred people participated in our study; fifty of them had sinus polyps and the other fifty were healthy. We recorded the patient's name, sex, age, chronic conditions, and nasal symptoms in our comprehensive ENT history. complaints citing sinus blockade, facial pain and odor. 3 ml of venous blood was drawn from each individual to extract RNA and measure the expression of microRNA-29 using RT-PCR.

**Results:** The median (IQR) among individuals with Sino-nasal polypi is lower when it comes to a high level of microRNA-29 biomarker under expression.

**Conclusions:** This study discovered that patients with Sino-nasal polyps were related to a considerable under-expression of microRNA-29.

**Keywords:** Polyps; MicroRNA; sinusitis.

## 1. Introduction

Polyps in the nasal passages are protruding, pedunculated, insensitive formations that develop from the nose and sinuses' chronically diseased and irritated mucosal tissues. Persons with long-term sinusitis are the most prevalent subset of people exhibiting this illness. As a consequence, the phrase chronic rhinosinusitis with nasal polyposis (CRSwNP) is frequently used when discussing nasal polyps. Managing an established situation involving Sino-nasal polyposis is merely the first step in treating it as an end-stage sign of unmanaged allergic reactions. After the polyps are under control, both local and systemic therapy that focuses on treating the underlying allergic cause needs to be put into place. The precise cause of Sino-nasal polyps is obscure. Many believe that the trigger of polyps is situations that lead to long-term

inflammation of the nose and nasal sinuses, characterized by edema and diverse infiltration of cells. Despite a substantial number of studies supporting this concept, the initialization cause remains unclear and may differ in every single instance [1].

Many scholars have been curious to understand more about the world of the novel tiny regulatory RNA molecules since the initial identification of microRNAs, over 20 years ago. While the basic principles of microRNA production and biofunction were identified early on, recent discoveries have provided new understandings of the structure and genetic configurations of the microRNA machinery at its basic level, the mechanisms that determine how microRNA substances and targets are selected from the transcript genome, and the biological mechanisms underlying a microRNA turnover [2].

## 2. Methods

### *2.1. Subjects*

One hundred participants visited the ENT clinics at Fayoum University Hospital.

### *Inclusion criteria*

Individuals with Sino-nasal polyps.

### *Exclusion criteria*

- Extremes of age.
- Pregnant females.
- Any debilitating medical disease.
- Severe cardiac or pulmonary diseases.

## 2.2. Study design

After learning about the study's objectives, every participant gave written, informed consent. Following the guidelines of the Declaration of Helsinki, the study was carried out as a controlled study. One hundred participants were divided into two groups for this study: group A consisted of fifty patients with nasal polyps, and group B consisted of fifty healthy persons.

An endoscopic examination verified the presence of nasal polyps in every participant over the age of eighteen. We excluded individuals with serious medical diseases like HIV, kidney problems, or cardiac disorders, as well as those who were being pregnant, or who had previously undergone surgery for any form of nasal disorder. An example is shown in **Figure 1**.

We thoroughly documented the patient's ENT history, including personal history, place of residence, smoking history, chronic illnesses, and asthma. Congestion, nasal obstruction, colored or watery discharge, odor-related issues, and itching are examples of nasal symptoms. We then carried out an endoscopic assessment to

ascertain the extent of nasal polyp obstruction. After that, each subject had three ml of venous blood drawn to extract microRNA and measure the fold change in microRNA-29 using RT-PCR (Qiagen, Germany) was used for the extraction of microRNA.

## Statistical Methods

Data organization, coding, and gathering were done to make data entry into the Microsoft Access application easier. The data was statistically analyzed using SPSS software version 16 on a Windows 7 computer (SPSS, Inc., USA) • Standard deviations are used for analyzing parametric data, arithmetic means are used to measure central tendency, and inferential statistical tests are used for basic descriptive analysis of qualitative data using percentages and numbers. When comparing two dependent quantitative data sets using a paired t-test for quantitative parametric data. - To compare two or more qualitative groups, use the Chi square test for qualitative data. - A bivariate correlation test to examine how well the variables are correlated. It was decided that the cut-off value for significance was level  $p < 0.05$ .



**Figure 1:** Endoscopic examination of the nasal airway showing protruding polyp from middle meatus.

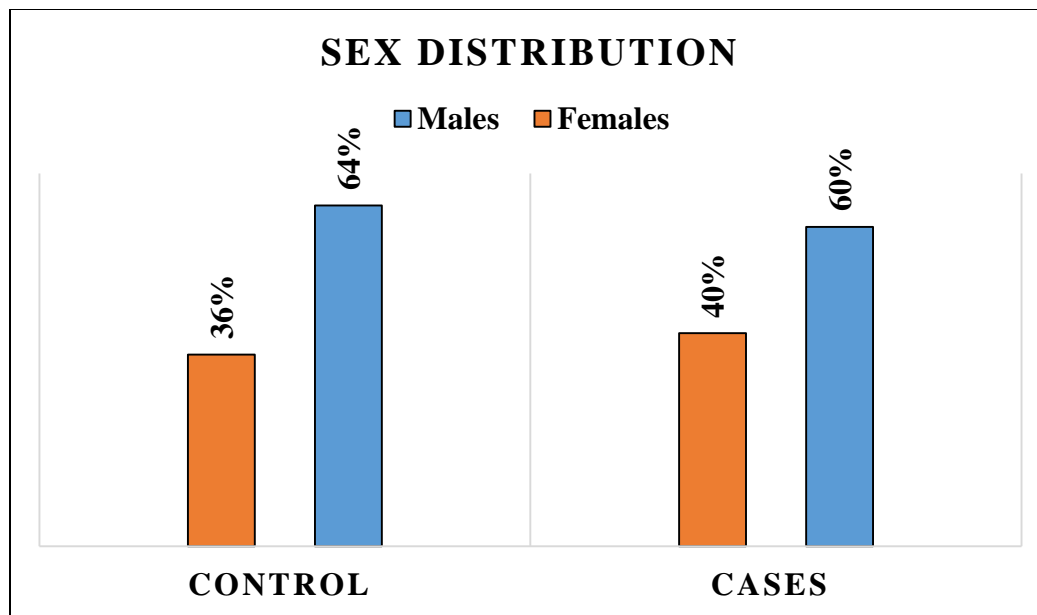
### 3. Results

Fifty patients (mean age of  $35.8 \pm$  SD 10.03 years) in the first group (Group A) ranged in age from eighteen to sixty years. Thirty of these patients were thirty men, and twenty were women. The fifty participants

in Group B, the second group, (mean of  $37.8 \pm 11.6$  years), with thirty-two males and eighteen females, was the control group (**Tables 1 & Figure 2**).

**Table 1:** Demographic characteristics of the research participants.

Variables		Group (A) sinus polyp patients	Group (B) healthy group
Age	Mean $\pm$ SD	35.8 $\pm$ 10.03	37.8 $\pm$ 11.6
	Range	18-60	22-64
Sex	Male	30	32
(N)	Female	20	18



**Figure 2:** The sex distribution between the groups in both cases and controls.

Regarding the Sino-nasal manifestations, of the diseased individuals, thirty-nine had moderate to severe nasal discharge, thirty-nine had hyposmia, and eleven had light nasal discharge.

This study included fifty patients with sinus polypi; seven patients had a history of asthma, none of them smoked, and four had

chronic illnesses such as Hypertension. In individuals with nasal polyps, the median expression of microRNA-29 was 0.745 (0.377-1.278), while the median expression in the control group was 1. Between the patient and control groups, there was a statistically significant difference with a low mean among the patients (under expression) ( $p < 0.05$ ).

#### 4. Discussion

With an incidence of about 4%, individuals who have polyps in their nasal cavities demonstrate a range of clinical symptoms and varied degrees of severity. Sinus polyps usually coexist with respiratory

asthma. Many people experience recidivism after receiving either medical treatment or surgery. The underlying mechanism behind sinonasal polypi is most often a Th2 cell-initiated process. Changes in IgE, IL-25, and

IL-33 levels, along with eosinophil infiltration and nasal polyps, are indicative of this inflammation [3].

Furthermore, there are significant amounts of macrophages, eosinophils, mast cell populations, and innate lymphoid cells. Sino-nasal polyps can be distinguished under a microscope by their degradation of extracellular matrix with notably distinct features, fibrin buildup, the proliferation of goblet mucus glands, and epithelial metaplasia [4].

Single-stranded RNAs with lengths ranging from 18- to 22 nucleotides have been identified as microRNAs. They are created by two sequential processing processes that are not translatable: first, primary microRNAs, referred to as pri-microRNAs, undergo modifications into pre-microRNAs, which are the antecedents of microRNAs, and then pre-microRNAs are altered into mature microRNAs. MicroRNAs modulate both transcriptional and post-transcriptional levels of gene transcription, and they are essential for virtually every recognized biological reaction, such as cell division and proliferation [5].

The development of many diseases sometimes begins with aberrant changes in

microRNA quantities. This implies that microRNAs could potentially serve as promising biomarkers that could be developed into therapeutic alternatives for a wide range of illnesses. Numerous microRNAs have been identified as significant mediators associated with a variety of diseases, including neurological, immunological, inflammatory, and cancerous problems. Some of these microRNAs have even been developed as prospective therapeutics for advanced illnesses [6].

While changes in intracellular microRNA levels are linked to sinus polyps, the patient's nasal lavage fluid (NLF)-EV (extracellular vesicles) also showed differences in microRNA activity [7].

The epithelial-to-mesenchymal transition (EMT), which affects the airway modification of CRSwNP, can be regulated by certain microRNAs. Steroids may have an impact on miR-155, a microRNA that is commonly used in medical research. discoveries indicating microRNA plays a role in the genetic and morphological aspects of sinus polyp growth and development, highlighting the significance of microRNAs in nasal polyps for

understanding their formation and devising efficient treatment strategies [8].

We recruited a total of one hundred individuals and divided them into two groups: the individuals with Sino-nasal polypi group and the healthy control group. Our results displayed that the patients with nasal polyps and the healthy controls differed statistically significantly, and the patients' mean expression of microRNA-29

was low (under expression). Patients with significant facial pain and blocked nasal passages had a lower median for the microRNA-29 marker.

## Conclusion

In this study, we found that patients with nasal polyps significantly under-expressed microRNA 29, and that the severity of several clinical symptoms was correlated with this under-expression.

## Ethical approval and consent to participate:

The Faculty of Medicine's Institutional Ethics Committee in Fayoum gave its approval to the study.

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**Conflicts of Interest:** All authors declare no conflict of interest.

## References

1. Fokkens WJ, Lund VJ, Mullol J, Bachert C, Alobid I, Baroody F, Cohen N, Cervin A, Douglas R, Gevaert P, Georgalas C, Goossens H, Harvey R, Hellings P, Hopkins C, Jones N, Joos G, Kalogjera L, Kern B, Kowalski M, Price D, Riechelmann H, Schlosser R, Senior B, Thomas M, Toskala E, Voegels R, Wang de Y, Wormald PJ. EPOS 2012: European position paper on rhinosinusitis and nasal polyps 2012. A summary for otorhinolaryngologists. *Rhinology*. 2012;50(1):1-12. doi: 10.4193/Rhino12.000.
2. Shang R, Lee S, Senavirathne G, Lai EC. microRNAs in action: biogenesis, function and regulation. *Nat Rev Genet*. 2023;24(12):816-833. doi: 10.1038/s41576-023-00611-y.
3. Fossiez F, Djossou O, Chomarat P, Flores-Romo L, Ait-Yahia S, Maat C, Pin JJ, Garrone P, Garcia E, Saeland S, Blanchard D, Gaillard C, Das Mahapatra B, Rouvier E, Golstein P, Banchereau J, Lebecque S. T cell interleukin-17 induces stromal cells to produce proinflammatory and hematopoietic cytokines. *J Exp Med*. 1996;183(6):2593-603. doi: 10.1084/jem.183.6.2593.
4. Kitapçı F, Muluk NB, Atasoy P, Koç C. Role of mast and goblet cells in the pathogenesis of nasal polyps. *J Otolaryngol*. 2006;35(2):122-32. doi: 10.2310/7070.2005.5004.

5. Macfarlane LA, Murphy PR. MicroRNA: Biogenesis, Function and Role in Cancer. *Curr Genomics*. 2010;11(7):537-61. doi: 10.2174/138920210793175895.
6. Ardekani AM, Naeini MM. The Role of MicroRNAs in Human Diseases. *Avicenna J Med Biotechnol*. 2010 Oct;2(4):161-79.
7. Zhipu N, Zitao H, Jichao S, Cuida M. Research advances in roles of microRNAs in nasal polyp. *Front Genet*. 2022;13:1043888. doi: 10.3389/fgene.2022.1043888.
8. Chiarella E, Lombardo N, Lobello N, Aloisio A, Aragona T, Pelaia C, Scicchitano S, Bond HM, Mesuraca M. Nasal Polyposis: Insights in Epithelial-Mesenchymal Transition and Differentiation of Polyp Mesenchymal Stem Cells. *Int J Mol Sci*. 2020;21(18):6878. doi: 10.3390/ijms21186878.