HNO

Original articles

HNO 2019 · 67 (Suppl 2):S51–S58
https://doi.org/10.1007/s00106-019-0623-9
Published online: 29 March 2019

M. Burkart[1] · P. Brueggemann[2] · A. J. Szczepek[3] · D. Frank[4] · B. Mazurek[2]

[1] Dr. Willmar Schwabe GmbH & Co. KG, Ettlingen, Germany
[2] Tinnituszentrum, Campus Charité Mitte, Charité—Universitätsmedizin Berlin, Berlin, Germany
[3] HNO Forschungslabor, Klinik für Hals-, Nasen-, Ohrenheilkunde, Campus Charité Mitte, Charité—Universitätsmedizin Berlin, Berlin, Germany
[4] ISM Global Dynamics GmbH, Bad Homburg, Germany

Intermittent tinnitus—an empirical description

Although tinnitus is usually divided into an acute or a chronic form, data from epidemiological studies show that the most frequent form is intermittent tinnitus. To date, little is known about this form of tinnitus and therefore the aim of the present study was to contribute to the empirical description of intermittent tinnitus.

Background

Tinnitus is classified into acute/recent onset or chronic/persistent forms in current textbooks and guidelines [21, 30, 31]. However, epidemiological studies have identified intermittent tinnitus as the most frequent type: In a representative cross-sectional study, 68% of respondents reporting tinnitus declined perceiving the sound constantly "all the time every day" [22]. Two studies in representative samples of US adults reported that more than 60% of those affected by tinnitus did not perceive it in a continuous daily manner but as intermittent [3, 26]. Little is known about intermittent tinnitus.

Current research has rarely considered the permanence of the condition. For example, most of the epidemiological studies did not differentiate between intermittent and continuous tinnitus [20]. The same applies to large cohort studies analyzing tinnitus characteristics, risk factors, or treatment responses [4, 9, 25]. Leading concepts developed to explain chronic tinnitus assume lasting changes in the auditory processing and are not readily applicable to intermittent tinnitus: Central nervous system (CNS) response to deafferentation in the auditory pathway [13], maladaptive plasticity [27], or central gain enhancement [2] are based on animal models with sustained alterations in the auditory system or observations in patients with continuous tinnitus. Many controlled clinical treatment trials were restricted to [8, 29, 32] or dominated by [5] patients with continuous tinnitus. Only one out of 229 clinical treatment trials that was recently reviewed explicitly allowed inclusion of patients with intermittent tinnitus [11].

To advance our knowledge of tinnitus pathology as well as of tinnitus subtypes, a better understanding of intermittent tinnitus is desirable. Here, we report the results of an explorative interview study of 320 subjects experiencing tinnitus, 62% of whom reported intermittent tinnitus.

Patients and methods

An explorative interview study on treatment usages and attitudes in subjects reporting tinnitus was conducted by ISM Global Dynamics GmbH, an experienced independent market research institution, in eight German cities in March 2015. Participants were recruited from market research address pools and by street recruiting to achieve a target sample of 320 subjects, aiming at a balanced gender ratio. The main inclusion criterion was self-report of tinnitus/sound in the ear during the past 12 months. The study focused on subjects with interest in treatment and with access to tinnitus treatment options. Therefore, participants younger than 20 years, those with low net income, or untreated subjects not or minimally afflicted by their tinnitus were excluded. According to standard practice in market research, health-care or market research professionals were excluded, too.

Computer-assisted face-to-face interviews were conducted by experienced professional interviewers in compliance with the International Code on Market and Social Research, issued by the International Chamber of Commerce/European Society for Opinion and Market Research, and current BVM (Berufsverband Deutscher Markt- und Sozialforscher e. V.) rules and regulations at professional market research institutes.

Here, we report results on sociodemographics, tinnitus characteristics, impact, and help-seeking behavior. Subjects were asked whether they experienced tinnitus during the past 12 months "continuously," "temporarily time and again," or "only once but for several days." According to the response, they were assigned to the continuous (C), intermittent (I), or single-episode (SE) tinnitus group.

The interviewers presented questions with predefined wording. Depending on the question, free responses, selections from predefined answer categories, or ratings on Likert scales were recorded.

The German version of this article can be found under https://doi.org/10.1007/s00106-019-0622-x.

Table 1 Sociodemographic characteristics of subjects

	Tinnitus during the past 12 months			
	Continuous (*n* = 50)	**Intermittent (*n* = 197)**	**Single episode (*n* = 73)**	**Group difference**
Female, *n* (%)	25 (50)	110 (56)	40 (55)	–
Age, mean (years)	49	49	48	–
Age group (years), n (%)				
20–39	11 (22)	28 (14)	3 (4)	C > SE; I > SE
40–59	29 (58)	151 (77)	69 (95)	I > C; SE > C; SE > I
60+	10 (20)	18 (9)	1 (1)	C > I; C > SE; I > SE
Married/partner, *n* (%)	38 (76)	155 (79)	52 (71)	–
Education, n (%)				
Secondary school only (9 years)	1 (2)	0 (0)	1 (1)	C > I
Professional training	8 (16)	21 (11)	17 (23)	I < SE
O-levels (10 years)	18 (36)	82 (42)	32 (44)	–
A-levels (13 years)	9 (18)	54 (27)	16 (22)	–
University graduate	14 (28)	40 (20)	7 (10)	C > SE; I > SE
Employment, n (%)				
Full time	37 (74)	152 (77)	58 (79)	–
Part time	5 (10)	34 (17)	8 (11)	–
Unemployed	1 (2)	2 (1)	0 (0)	–
Homemaker	2 (4)	1 (1)	5 (7)	C > I; I < SE
Pension	5 (10)	6 (3)	2 (3)	C > I
Student	0 (0)	2 (1)	0 (0)	–

Significant differences ($p < 0.05$, post hoc χ^2 statistics) between the groups with continuous (C), intermittent (I), or a single episode of (SE) tinnitus are indicated in the "group difference" column

Predefined answer categories (as detailed in the tables) were used for concomitant complaints and impairment (**Table 2**), perceived triggers (**Table 3**), and help-seeking behavior (**Table 4**). Subjects were asked to categorize tinnitus severity as (1) minimal or no impairment, (2) some impairment (e. g., in silence, under stress), or (3) severe impairment and heavy burden to daily life. In addition, responses to the question, "To what extent do you feel impaired by your tinnitus?" were recorded on a five-point Likert scale (1 = not at all to 5 = very strongly).

Results were tabulated descriptively. Group differences were analyzed via the χ^2 test statistic, Kruskal–Wallis *H* test, or one-way analysis of variance (ANOVA) with post hoc Scheffé test, as applicable according to item scaling. For questions with distinct categorical answer options (e. g., highest education), an overall χ^2 statistic was calculated for all categories across the three groups. If significant, χ^2 statistics for each pair of groups were calculated for each individual category. For questions allowing for multiple categorical answers (e. g., concomitant complaints), χ^2 statistics for each pair of groups were calculated for each individual category. Statistical analyses were performed with GESS tabs (GESS mbh, Hamburg, Germany) and SPSS statistical package (IBM, Armonk/NY, USA).

Results

Of 320 participants with self-reported tinnitus, 50 (16%) reported continuous tinnitus, 197 (62%) intermittent tinnitus, and 73 (23%) a single episode during the past 12 months.

The three groups were comparable in gender distribution, mean age, and marital status (**Table 1**). Although mean age was nearly identical, the age distribution was flatter in the group with continuous than intermittent tinnitus and in the group with intermittent tinnitus than with a single episode ($\chi^2 = 24.2$; $p < 0.001$). In total, 20% of subjects with continuous tinnitus were 60 years of age and older, while there were 10% of patients with intermittent tinnitus and only 1% of patients with a single episode in this age group. Likewise, 22%, 14%, and 4%, respectively, were younger than 40 years. Slight differences were observed in highest education ($\chi^2 = 17.3$; $p = 0.03$) and employment status ($\chi^2 = 19.2$; $p = 0.04$): More subjects with continuous than with intermittent tinnitus had academic education or were retired. Professional training only was reported more frequently by subjects with a single episode compared with those with intermittent tinnitus.

The mean time since first onset of tinnitus was longest in subjects with continuous tinnitus, intermediate for intermittent tinnitus, and shortest in subjects with a single episode during the past 12 months: 36, 28, and 19 months, respectively; ANOVA $F(2,317) = 12.539$; $p < 0.001$. No subject with persistent tinnitus, only 2% of subjects with intermittent tinnitus, and 3% of those with a single episode reported onset within the past 3 months. A period since first onset of 3 years and longer was reported by 48%, 32%, and 17% of respondents, respectively. Most subjects with intermittent tinnitus experienced episodes of a few days' duration, and 25% experienced episodes of 1–4 weeks (**Fig. 1**). The mean duration (1.6 weeks) of symptoms was significantly shorter than that of subjects reporting a single episode: 3.0 weeks; ANOVA $F(1,252) = 7.546$; $p = 0.006$. The frequency of tinnitus episodes was spread between every few days to half-yearly or less, with the majority of subjects reporting a frequency of between every 2 and every 12 weeks and a mean frequency of every 7 weeks. Most concomitant complaints were reported at comparable frequencies in all three groups (**Table 2**). Asthenia (40% vs. 24%), depression (24% vs. 10%), and social isolation (8% vs. 2%) were more prevalent in subjects with continuous than with intermittent tinnitus.

Tinnitus-related impairment was more severe in the group with continuous

tinnitus (Table 2). The mean impairment rating was significantly higher (Kruskal–Wallis $\chi^2 = 10.4$; $p = 0.006$) and a larger proportion of subjects reported severe impairment of daily life ($\chi^2 = 58.8$; $p < 0.001$). Subjects with continuous tinnitus reported more helplessness than the other two groups (56% vs. 36% vs. 32%, respectively) and more frequently an anxious reaction than those with a single episode (28% vs. 14%, respectively). Situational impairment was comparable between subjects with continuous and intermittent tinnitus; only impairment on vacation was reported more frequently with continuous tinnitus (18% vs. 8%). Subjects with a single episode reported less impairment in all situations.

The leading perceived main triggers of tinnitus were occupational and private stress in all three groups (Table 3). Ear disorders or drugs were rarely perceived as triggers, noise was perceived as a trigger by 10–20% of subjects, and some other health condition (e. g., hypertension, circulation problems, unhealthy lifestyle) was perceived as a trigger by more than 10% of subjects. When comparing continuous with intermittent tinnitus, psychiatric disorders (16% vs. 6%, respectively) and inner ear disorders (8% vs. 1%, respectively) were reported more frequently in subjects with continuous tinnitus. Among the 294 subjects in full or part-time employment, the reported occupational noise exposure was comparable between groups.

Help-seeking behavior was comparable between subjects with continuous and intermittent tinnitus in many aspects (Table 4). Two thirds had consulted a physician and more than half used nonpharmacological treatments. The only difference between both groups was that subjects with continuous tinnitus took more medication for tinnitus (88% vs. 66%, respectively), especially medication from the pharmacy (84% vs. 52%, respectively), and fewer products from the drug store/supermarket (4% vs. 15%, respectively). By contrast, subjects with a single episode reported significantly less help-seeking behavior; only one third had consulted a physician ($\chi^2 = 23.6$; $p < 0.001$), 40% took medication for tinnitus ($\chi^2 = 7.28$ $p = 0.026$), and one quarter did nothing.

Abstract

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M. Burkart · P. Brueggemann · A. J. Szczepek · D. Frank · B. Mazurek

Intermittent tinnitus—an empirical description

Abstract

Background. Tinnitus is often classified into acute or chronic persistent forms. However, epidemiologic studies have shown that intermittent tinnitus (IT), which does not clearly belong to either category, is the most common form.

Objective. The aim of this study was to further characterize IT empirically.

Materials and methods. We conducted an exploratory cross-sectional interview study among 320 subjects with tinnitus. Sociodemographic and tinnitus characteristics, concomitant complaints, perceived triggers, and help-seeking behavior were assessed. Subjects were classified into continuous (CT), IT, or single-episode tinnitus (SET) if they had experienced tinnitus "continuously," "temporarily time and again," or "only once but for several days," respectively, during the past 12 months.

Results. Of the sample, 62% reported IT, 23% SET, and 16% CT. Mean time since onset was 36 (CT), 28 (IT), and 19 months (SET), respectively. Most subjects with IT experienced episodes lasting a few days, whereas in 25%, episodes lasted 1–4 weeks. Mean duration was 1.6 weeks. The frequency of IT episodes ranged from every few days to half-yearly; mean frequency was every 7 weeks. Leading triggers were occupational and private stress. Asthenia, depression, social isolation, psychiatric disorders, and inner ear disorders were more prevalent among CT than IT subjects. Help-seeking behavior was comparable between CT and IT.

Conclusion. IT is associated with emotional reactions and situational impairment severe enough to trigger multiple treatment attempts, but usually does not result in severe impairment. Inner ear disorders and psychological changes are less frequent than in CT; therefore, treatment response and prognosis might be better. We suggest classification of tinnitus into acute single-episode (<3 months), intermittent, or chronic persistent (>3 months) forms.

Keywords

Psychological phenomena · Sociological factors · Help-seeking behavior · Classification · Social behavior

Discussion

Intermittent tinnitus has been reported to be the most frequent tinnitus type in population-based epidemiological studies. Because our sample was not representative, frequency data from our study cannot be generalized. Nevertheless, although subjects in our study were not sampled according to tinnitus type, 62% of subjects reported intermittent tinnitus, a figure that is close to the population estimates of 64–68% [22, 26]. Therefore, we are confident that our data provide some valuable insights into the subtyping of tinnitus and the phenomenology of intermittent tinnitus.

Sociodemographic characteristics

Although the main purpose of this report was to describe intermittent tinnitus in terms of sociodemographics, tinnitus characteristics, impact, and help-seeking behavior among the affected individuals, our data allow us to explore differences between intermittent tinnitus, a single episode, and—most importantly—chronic persistent tinnitus.

We observed a significant prevalence of intermittent tinnitus in all age groups and both genders and no striking age or gender differences between subjects reporting intermittent or continuous tinnitus. Since our sample was not age-representative owing to the exclusion criteria and a balanced gender ratio was recruited, we cannot generalize our observations. No consistent age or gender characteristics of intermittent tinnitus were reported in representative population samples: In a previously published study, intermittent tinnitus was reported to be somewhat more frequent in men and the prevalence of both intermittent and continuous tinnitus increased with age [22]. However, the proportion of subjects with

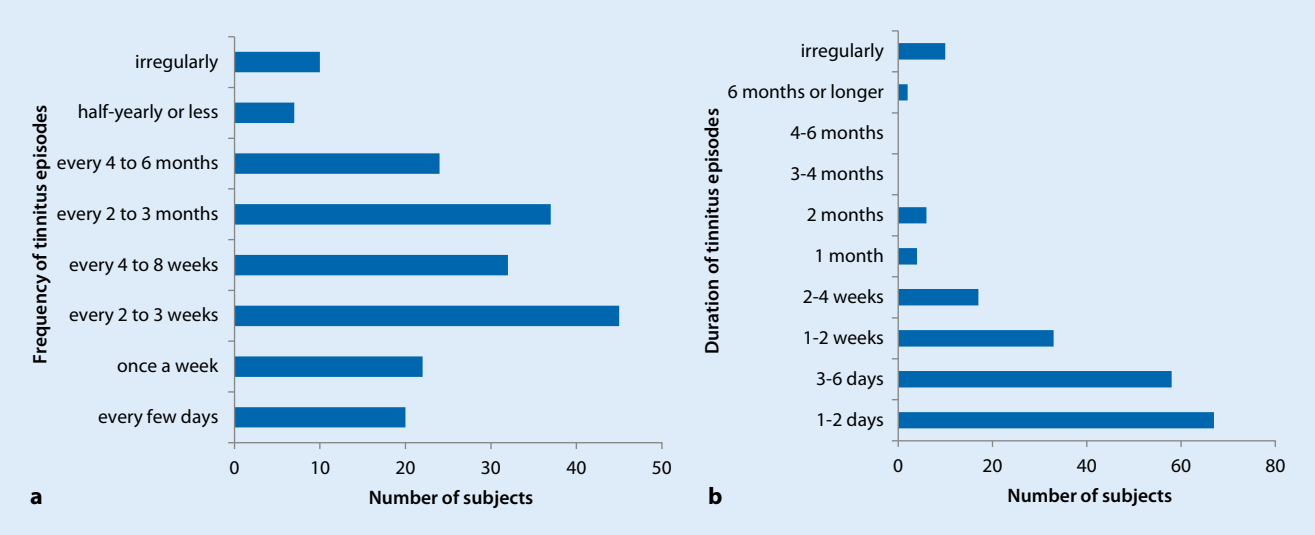

Fig. 1 ▲ Frequency (**a**) and duration (**b**) of tinnitus episodes in 197 subjects reporting intermittent tinnitus

tinnitus experiencing the sound intermittently decreased with age from 85% (18–25 years) to 59% (>65 years). In another sample, women were slightly more frequently affected by intermittent compared with persistent tinnitus; while the prevalence of intermittent tinnitus was stable across age groups, persistent tinnitus was more prevalent with advancing age [26]. Apparently, age or gender are not major risk factors for intermittent tinnitus. The lack of an age association suggests that hearing loss, a major age-associated condition, might be of limited relevance in intermittent tinnitus. In line with this hypothesis, hearing impairment was reported by 22% of subjects with continuous and 16% with intermittent tinnitus.

We observed a larger proportion of college and university graduates among subjects with continuous and intermittent tinnitus. High-level education likely promotes the achievement of professional positions associated with high stress levels. Occupational stress was perceived as the leading tinnitus trigger in our sample. This might explain the observed association between education and tinnitus severity. Such an association has been reported in clinical samples [12], but not in population samples [26]. Because our exclusion criterion net income might have resulted in oversampling of subjects with higher education, this association might be weaker in the general population.

Duration and course

The population-based studies did not report time since first onset for intermittent tinnitus [3, 22, 26]. In our sample, only three subjects with intermittent tinnitus reported the onset being within the past 3 months; the mean time since onset was 28 months. This implies that intermittent tinnitus can occur over years, although affected subjects are free of tinnitus most of the time. This observation is different from fluctuations in tinnitus loudness and distress that have been reported [1, 23]. We observed that subjects with chronic persistent tinnitus had significantly longer average time since onset than did subjects with intermittent tinnitus. This difference might indicate that intermittent tinnitus can deteriorate to continuous tinnitus over time, at least in a proportion of subjects. Longitudinal studies are needed to better describe the natural course of intermittent tinnitus. Only such studies can clarify whether and to what extent intermittent tinnitus evolves into persistent tinnitus. Subjects with intermittent tinnitus are likely to be a heterogeneous group. Longitudinal studies are needed to identify risk and resilience factors of deterioration to persistent tinnitus. If longitudinal studies identify intermittent tinnitus as an important risk factor for the development of chronic persistent tinnitus, it would become an important target stage for interventions.

The impact of intermittent tinnitus was between that of persistent tinnitus and that of single-episode tinnitus. Subjects with intermittent tinnitus reported a significant number of concomitant complaints, negative emotional reactions, and situational impairment. Severe sequelae such as depression or social isolation were less frequent, however. In our sample, self-reported depression rates were 24% and 10% for continuous and intermittent tinnitus, respectively. Similarly, in one of the representative US samples, 25% of subjects reporting persistent tinnitus and 17% of those with intermittent tinnitus were diagnosed with major depressive disorder [26].

Help-seeking behavior

Help-seeking behavior was comparable between subjects with persistent and intermittent tinnitus in our study. Together these data indicate that the burden of intermittent tinnitus can be significant enough to trigger multiple treatment attempts, while the condition does not lead to severe impairment in the majority of cases. We excluded subjects who were not at all bothered by their tinnitus. Therefore, our data might overestimate absolute rates of treatment-seeking behavior.

Table 2 Tinnitus characteristics and impact

	Tinnitus during the past 12 months			
	Continuous (*n* = 50)	**Intermittent (*n* = 197)**	**Single episode (*n* = 73)**	**Group difference**
Time since onset, mean (months)	36	28	19	$p < 0.001$, C > I*; C > SE*; I > SE*
Duration of episodes, mean (weeks)	–	1.6	3.0	$p = 0.006$
Concomitant complaints, n (%)				
Concentration difficulties	25 (50)	108 (55)	35 (48)	–
Difficulties falling asleep	23 (46)	98 (50)	31 (42)	–
Irritability	26 (52)	92 (47)	33 (45)	–
Headache	21 (42)	100 (51)	30 (41)	–
Asthenia	20 (40)	47 (24)	18 (25)	C > I**
Impaired mental well-being/mood	12 (24)	56 (28)	13 (18)	–
Overreaction/irritability in stress situations	16 (32)	51 (26)	14 (19)	–
Vertigo	9 (18)	38 (19)	8 (11)	–
Hearing impairment	11 (22)	32 (16)	8 (11)	–
Difficulties coping with daily life on the job and at home	8 (16)	32 (16)	8 (11)	–
Depression	12 (24)	20 (10)	5 (7)	C > I**; C > SE**
Anxiety	4 (8)	7 (4)	6 (8)	–
Social isolation	4 (8)	4 (2)	2 (3)	C > I**
Reduced self-confidence	2 (4)	6 (3)	0 (0)	–
None	3 (6)	3 (2)	2 (3)	–
Impairment, n (%)				$p < 0.001$
None or minimal	1(2)	2 (1)	0 (0)	–
Some (in silence, under stress)	20 (40)	170 (86)	65 (89)	C < I**; C < SE**
Severe impairment of daily life	29 (58)	25 (13)	8 (11)	C > I**; C > SE**
Mean impairment (5-point Likert scale)	3.8	3.5	3.4	$p = 0.006$; C > I**; C > SE**
Emotional reaction, n (%)				
Irritated	36 (72)	158 (80)	52 (71)	–
Helpless	28 (56)	71 (36)	23 (32)	C > I**; C > SE**
Annoyed	16 (32)	59 (30)	23 (32)	–
Anxious	14 (28)	33 (17)	10 (14)	C > SE**
Other	6 (12)	16 (8)	10 (14)	–
Situational impairment, n (%)				
At night	29 (58)	132 (67)	34 (47)	I > SE**
At work	26 (52)	105 (53)	29 (40)	I > SE**
During leisure time	26 (52)	100 (51)	23 (32)	C > SE**; I > SE**
At home	18 (36)	63 (32)	12 (16)	C > SE**; I > SE**
On vacation	9 (18)	15 (8)	0 (0)	C > I**; C > SE**; I > SE**

Significant differences between the groups with continuous (C), intermittent (I), or a single episode of (SE) tinnitus are indicated in the "group difference" column
*$p < 0.05$, post hoc Scheffé test
**$p < 0.05$, χ^2 statistics

Nevertheless, we observed that intermittent tinnitus is a frequent phenomenon among those bothered by and seeking treatment for the condition.

Triggers

Maladaptive neuronal plasticity is a prominent concept for the pathophysiology of chronic persistent tinnitus [27]. However, it is less clear how processes such as reorganization of tonotopic maps or hyperexcitability of auditory structures could explain a sensation occurring every few weeks for a mean duration of 1.6 weeks. Knippers et al. suggested that elevated cortisol levels might impact the vulnerability of the inner hair cell synapse and the degree of deafferentation, thereby changing the risk for the generation of a nonadaptive (tinnitus) central circuitry response [13].

Psychosocial and occupational stress has been identified as an important trigger and modulator of tinnitus; effects of stress on the auditory system, attention, memory, learning, and emotions have been considered to mediate this association [13, 18, 19, 23]. Recent functional magnetic resonance imaging (fMRI) studies in tinnitus patients identified over-activation to acoustic stimuli and altered resting network connectivity of limbic areas involved in stress reactivity and emotional processing [13, 16, 27, 28]. Acute stress can alter resting-state network connectivity and cortical activation to acoustic stimuli within minutes [6, 17], and mindfulness meditation has been reported to modify resting-state functional connectivity within 3 days [7]. Therefore, we propose that stress-related intermittent tinnitus primarily arises from stress-induced reversible alterations of functional brain networks. This concept would account for the observed short duration of a few days only, the perception of stress as a main trigger, and no reports on inner ear disorders in the majority of patients. Such stress-induced network changes could also exacerbate underlying subclinical alterations of the auditory system associated with increased firing rates [14, 24]. By contrast, inner ear pathologies/triggers have been reported

Table 3 Perceived main triggers and occupational noise exposure

	Tinnitus during the past 12 months			
	Continuous ($n = 50$)	Intermittent ($n = 197$)	Single episode ($n = 73$)	Group difference
Perceived main trigger, n (%)				
Occupational stress	29 (58)	128 (65)	46 (63)	–
Private stress	15 (30)	84 (43)	20 (27)	I > SE
Physical inactivity	6 (12)	33 (17)	7 (10)	–
Impaired inner ear circulation	12 (24)	17 (14)	7 (10)	C > SE
Hypertension	8 (16)	30 (15)	5 (7)	–
Heavy noise exposure, acoustic trauma	10 (20)	20 (10)	11 (15)	–
Unhealthy lifestyle	4 (8)	27 (14)	3 (4)	I > SE
Mental illness (e. g., depression)	8 (16)	12 (6)	4 (5)	C > I
Cervical spine or mandibular joint malposition	5 (10)	13 (7)	3 (4)	–
Sudden hearing loss	5 (10)	9 (5)	5 (7)	–
Hypothyroidism	4 (8)	7 (4)	2 (3)	–
Vestibular disorder	4 (8)	6 (3)	3 (4)	–
Drugs	1 (2)	6 (3)	3 (4)	–
Ear canal obstruction	1 (2)	4 (2)	3 (4)	–
Inner ear disorder (e. g., Meniere's disease)	4 (8)	2 (1)	1 (1)	C > I
Allergies	1 (2)	3 (2)	1 (1)	–
Other	2 (4)	6 (3)	3 (4)	–
Occupational noise exposure, n (%)				
Very strong	1 (2)	0 (0)	3 (5)	–
Strong	4 (10)	17 (9)	3 (5)	–
Moderate	18 (43)	100 (54)	36 (55)	–
None	19 (45)	69 (37)	24 (36)	–

Significant ($p < 0.05$, χ^2 statistics) differences between the groups with continuous (C), intermittent (I,) or a single episode of (SE) tinnitus are indicated in the "group difference" column

by a significant proportion of patients with continuous tinnitus. Moreover, depression as a trigger or concomitant complaint, concomitant asthenia, and a helpless reaction were reported more frequently in subjects with continuous vs. intermittent tinnitus. It is plausible that additional depression-related factors contribute to the development of chronic continuous tinnitus.

Finally, subjects with intermittent tinnitus are an attractive research population. The major drawback of cross-sectional studies comparing patients with persistent tinnitus with controls is the uncertainty of whether the detected differences represent a predisposing factor contributing to tinnitus or a reaction to tinnitus. By contrast, patients with intermittent tinnitus experience repetitive times with and without tinnitus and can serve as their own controls in the analysis of psychological and biological factors associated with the perception of tinnitus. This might promote the understanding of some basic mechanisms involved in the development of stress-related tinnitus.

Limitations

The main limitation of our study is that it was conducted in a market research setting employing standard market research tools to allow for quick recruitment of a large sample. Scientific tools recommended for tinnitus research, such as validated questionnaires, audiometry, or structured diagnostic interviews [10, 11, 15], were not applied. Consequently, also the data on perceived main triggers are solely based on participants' self-reports. It was not ensured that all participants interpreted the various categories (i. e., mental illness, sudden hearing loss) identically and that information given was based on equal sources (i. e., specialist diagnosis). Therefore, our results should be considered as preliminary and further studies of intermittent tinnitus employing validated tinnitus research tools are recommended.

Tinnitus classification

Based on the differences we observed between subjects reporting a single episode, chronic persistent, or intermittent tinnitus and provided that our results are confirmed by further studies, we suggest classifying tinnitus according to its temporal characteristics into:

- Acute single episode (less than 3 months' duration)
- Intermittent
- Chronic persistent (more than 3 months' duration)

Future research should validate whether this classification translates into differential prognosis and treatment responses.

Practical conclusion

- **Intermittent tinnitus is the most frequent type of tinnitus that can affect all age groups and genders.**
- **It is associated with concomitant complaints, negative emotional reactions, and situational impairment severe enough to trigger multiple treatment attempts, but it does not result in severe impairment in the majority of cases.**
- **Intermittent tinnitus is not covered by current guidelines and treatment recommendations.**
- **Inner ear disorders and psychological changes linked to depression may occur less frequently than in subjects with persistent tinnitus.**
- **Treatment responses as well as prognosis might be better and differ**

Table 4 Help-seeking behavior

	Tinnitus during the past 12 months			
	Continuous ($n = 50$)	**Intermittent ($n = 197$)**	**Single episode ($n = 73$)**	**Group difference**
Consulted a physician, n (%)				
Primary care	12 (24)	52 (26)	14 (19)	–
Ear–nose–throat	7 (14)	28 (14)	5 (7)	–
Both	15 (30)	49 (25)	7 (10)	C > SE; I > SE
None	16 (32)	68 (35)	47 (64)	C < SE; I < SE
Took medication, n (%)	44 (88)	130 (66)	29 (40)	C > I; C > SE;I > SE
Prescription	3 (6)	1 (1)	1 (1)	C > SE
Pharmacy	42 (84)	103 (52)	21 (29)	C > I; C > SE; I > SE
Drug store/supermarket	2 (4)	30 (15)	9 (12)	C < I
Used nonpharmacological treatment, n (%)	27 (54)	113 (57)	38 (49)	–
Healthy diet	12 (24)	73 (37)	6 (8)	C > SE; I > SE
Exercise	11 (22)	67 (34)	13 (18)	I > SE
Relaxation technique (e. g., yoga, autogenic training)	10 (20)	45 (23)	18 (25)	–
Acupuncture	6 (12)	19 (10)	3 (4)	–
Body therapy, hydrotherapy, biofeedback, Tai Chi	2 (4)	9 (5)	4 (5)	–
Psychotherapy	3 (6)	9 (5)	0 (0)	C > SE
Physical therapy	3 (6)	8 (3)	2 (3)	–
Noiser	2 (4)	4 (2)	1 (1)	–
Tinnitus counseling	2 (4)	2 (1)	0 (0)	–
Magnetic/electrical brain stimulation	2 (4)	1 (1)	0 (0)	–
Did nothing, n (%)	1 (2)	21 (11)	19 (26)	C < SE; I < SE

Significant ($p < 0.05$, χ^2 statistics) differences between the groups with continuous (C), intermittent (I), or a single episode of (SE) tinnitus are indicated in the "group difference" column

from those for patients with chronic persistent tinnitus.

- **Research of intermittent tinnitus could provide basic insights into the development of stress-related tinnitus and is highly recommended.**

Corresponding address

Prof. Dr. B. Mazurek
Tinnituszentrum,
Campus Charité Mitte,
Charité—Universitätsmedizin Berlin
Luisenstr. 13, 10117 Berlin, Germany
birgit.mazurek@charite.de

Funding. This research was funded by Dr. Willmar Schwabe GmbH & Co. KG, Karlsruhe, Germany.

Compliance with ethical guidelines

Conflict of interest B. Mazurek is director and M. Burkart, P. Brueggemann, and A.J. Szczepek are full-time employees of organizations offering tinnitus treatments. D. Frank is managing director of ISM Global Dynamics, the organization conducting the study.

The study was conducted in accordance with the International Code on Market and Social Research of the International Chamber of Commerce/European Society for Opinion and Market Research and current BVM (Berufsverband Deutscher Markt- und Sozialforscher e. V.) guidelines. All respondents gave their consent.

The supplement containing this article is not sponsored by industry.

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