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Knowledge, attitudes, and practices among patients with impacted wisdom teeth toward teeth extraction

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Knowledge, attitudes, and practices among patients with impacted wisdom teeth toward teeth extraction

Running Title: KAP toward wisdom teeth extraction

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ABSTRACT

Objectives: This study aimed to assess the knowledge, attitudes, and practices (KAP) among patients with impacted wisdom teeth toward tooth extraction, with the intention of identifying gaps and opportunities for improved dental health education and practices. **Design:** A cross-sectional study employing a web-based questionnaire.

Setting: The study was conducted at the Department of Oral and Maxillofacial Surgery, School and Hospital of Stomatology, Cheeloo College of Medicine, Shandong University, and Jinan Stomatological Hospital.

Participants: This study garnered responses from 3,467 individuals presenting with impacted wisdom teeth at the study settings between March and May 2023.

Primary and Secondary Outcome Measures: The primary outcomes measured were the levels of knowledge, attitudes, and practices toward wisdom teeth extraction among participants. The knowledge was assessed on a scale of 0-11, attitudes on a scale of 10-50, and practices on a scale of 11-55. Secondary outcomes included the exploration of relationships between knowledge, attitudes, and practices using structural equation modeling.

Results: Participants demonstrated a mean knowledge score of 9.1 ± 1.4 , mean attitude score of 38.0 ± 2.7 , and mean practice score of 41.7 ± 8.2 . The analysis using a structural equation model revealed a direct effect of knowledge on attitudes (path coefficient = 2.042, p<0.001) and a direct effect of attitudes on practices (path coefficient = 1.460, p<0.001).

Conclusions: The findings suggest that patients with impacted wisdom teeth possess sufficient knowledge and favorable attitudes towards teeth extraction, which positively influences their practices. However, there is still a need for tailored interventions to further enhance the KAP toward wisdom teeth extraction in this population.

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Strengths and limitations of this study

- This study, while offering significant insights into the knowledge, attitudes, and practices of patients with impacted wisdom teeth regarding tooth extraction, is characterized by both strengths and limitations related to its methodology. Firstly, the large sample size utilized in the survey enhances the representativeness and generalizability of the findings, ensuring that the results can be applied to a broader population with similar conditions.
- Furthermore, the comprehensive exploration of the relationships between knowledge, attitudes, and practices provides valuable insights that can inform clinical guidance and patient education strategies.
- However, the study's reliance on self-reported data may introduce discrepancies between reported behaviors and actual practices, potentially affecting the accuracy of the findings.

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 Additionally, the exclusive use of online surveys for data collection could lead to non-response bias, as certain demographics may be underrepresented among respondents. Despite these limitations, the study's methodological strengths contribute to a deeper understanding of patient perspectives on wisdom teeth extraction, offering a foundation for future research and clinical improvements in this area.

Keywords: Knowledge; Attitude; Practice; Cross-Sectional Study; Wisdom teeth;

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Introduction

Impacted wisdom teeth constitute a significant public health issue due to their high prevalence and the associated complications[1]. Epidemiological evidence indicates that a substantial proportion of the adult population will develop at least one impacted wisdom teeth, necessitating consideration for extraction to mitigate potential risks such as infection, crowding, and other dental pathologies[1, 2].

Nevertheless, the extraction procedure for impacted wisdom teeth is fraught with challenges. It is well-documented that these procedures can elicit significant psychological stress in patients, resulting in dental anxiety or phobia[3]. This stress is exacerbated by the complexity and invasiveness inherent in the extraction of impacted teeth, which can amplify patients' apprehensions and uncertainties concerning dental care[4, 5]. Such anxiety and uncertainty negatively impact patients' attitudes towards dental health and treatment, potentially leading to detrimental dental health behaviors, delayed care-seeking, and consequently, poorer dental and overall health outcomes[6,

7].

Knowledge-Attitude-Practice (KAP) model posit that an individual's knowledge significantly influences their attitudes towards health and illness, which, in turn, shapes their health-related behaviors[8, 9]. Despite the recognition of dental anxiety among patients with impacted wisdom teeth, there exists a conspicuous gap in the research literature regarding the application of the KAP model to comprehend and address this issue. Predominant research efforts have been directed towards delineating the prevalence of dental anxiety and its determinants within this demographic[3, 10, 11],

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with insufficient focus on elucidating how knowledge and attitudes concerning wisdom teeth impaction and extraction affect health behaviors.

Thus, this study aims to bridge this gap by leveraging the KAP framework to investigate the knowledge, attitudes, and practices toward wisdom teeth extraction among patients with impacted wisdom teeth.

Materials and Methods

Study design and participants

This cross-sectional study was conducted between March and May 2023 at Department of Oral and Maxillofacial Surgery, School and Hospital of Stomatology, Cheeloo College of Medicine, Shandong University and Jinan Stomatological Hospital.

The inclusion criteria as follows: 1) patients diagnosed with impacted wisdom teeth at the Department of Oral and Maxillofacial Surgery, School and Hospital of Stomatology, Cheeloo College of Medicine, Shandong University, and 2) patients proficient in the Chinese language to ensure effective communication during the data collection process. Conversely, those who reported participation in similar studies were excluded from this study. This study was approved by the Ethics Committee of the School and Hospital of Stomatology, Cheeloo College of Medicine, Shandong University (Ethical No. 20230361), The medical ethics committee of Jinan Stomatological Hospital (JNSKQYY-2023-001) and informed consent was obtained from all patients.

Questionnaire introduction and data collection

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The questionnaire was designed with reference to relevant guidelines and previous literature[12, 13], and was revised by two chief physicians and one vice-chief physician. A pilot test was conducted (n=34) and Cronbach's α coefficient value was 0.819, indicating a good internal consistency.

The final questionnaire contains four dimensions: demographic characteristics, knowledge, attitudes and practices. The knowledge dimension consists of 13 questions, with 1 point for a correct answer and 0 points for the rest. Questions K5 and K10 were designed as trap questions, presenting exactly opposite meanings. patients who selected "right" or "wrong" for both questions were deemed to have a logical conflict and were excluded from the survey. Consequently, the knowledge scores ranged from 0 to 11 points. The attitudes dimension consists of 13 questions, wherein questions A11-A13 are designated exclusively for descriptive analysis purposes. The remaining questions utilized a 5-point Likert scale, ranging from very positive (5 points) to very negative (1 point), yielding a possible score range of 10-50 points. The practices dimension consists of 11 questions using a 5-point Likert scale as well, ranging between very conforming (5 points) to very non-conforming (1 point), with a possible score range of 11-55 points. Both electronic and printed versions of the questionnaire were utilized in this study. The electronic questionnaire was hosted on Sojump (http://www.sojump.com), an online survey platform. At the onset of it, patients were required to indicate their consent by clicking the option "I agree to participate in this study" before proceeding to respond to the questions. The data collection process ensured anonymity. Additionally, an IP restriction was implemented to prevent duplication of responses,

restricting the survey completion to a single instance from each unique IP address. To accommodate individuals less acquainted with electronic devices, such as elderly patients, printed questionnaires were made available during their clinic visit, and they were requested to complete the printed forms. During the dissemination of it, five trained research assistants first introduced the study face-to-face to patients before distributing the questionnaires. They also assisted patients when needed, checked questionnaire completeness, and asked the patients to complete any missing information.

Statistical analysis

STATA 17.0 (STATA Corporation, College Station, TX, USA) was utilized for statistical analyses. Continuous variables were presented as mean±standard deviation (SD) and were compared using the student's t-test or one-way analysis of variance (ANOVA). Categorical variables were presented as numbers (percentages). In this study, 70% of the total score was used as the cut-off value, that means the threshold for sufficient knowledge, favorable attitudes, and proactive practices were 7.7, 35 and 38.5 points respectively[14]. Pearson correlation was used to analyze the correlation between knowledge, attitudes, and practices. Variables with p<0.02 in the single-factor logistic regression analysis are included in the multivariate logistic regression analysis. AMOS 24.0 (IBM, NY, USA) was utilized to construct a structural equation model (SEM) examining the knowledge, attitudes, and practices of patients with impacted wisdom toward wisdom teeth extraction. This SEM tested the main hypotheses as follows: 1) knowledge had direct effects on attitudes, 2) knowledge had direct effects

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on practices, and 3) attitudes had direct effects on practices. Model fit was evaluated using CMIN/DF (Chi-square goodness-of-fit test/Degrees of Freedom), RMSEA (Root Mean Square Error of Approximation), IFI (Incremental Fixation Index), TLI (Tucker-Lewis index) and CFI (Comparative Fixation Index). A two-sided p-value <0.05 was considered statistically significant.

Results

A total of 3467 patients participated in this study. Among them, 1092 (31.50%) were aged 30 or below, 2259 (65.16%) were female, 2927 (84.42%) lived in urban areas, and 2391 (68.96%) brushed their teeth twice daily. In addition, 1790 (51.63%) had undergone wisdom teeth extraction. The mean scores of knowledge, attitudes, and practices were 9.1 ± 1.4 (possible range: 0-11), 38.0 ± 2.7 (possible range: 10-50), and 41.7 ± 8.2 (possible range: 11-55), respectively (**Table S1**).

The three knowledge items with the highest correctness rates were "The primary issues associated with wisdom teeth are insufficient space and misalignment." (K2), with a correctness rate of 89.59%, "Wisdom teeth are unlikely to cause damage to neighboring teeth, even if left untreated promptly." (K5), with a correctness rate of 88.78%, and "Delaying the treatment of wisdom teeth may result in harm to neighboring teeth." (K10), with a correctness rate of 88.78%. The three items with the lowest correctness rates were "In cases where the growth of wisdom teeth leads to a severe infection, fever may not necessarily be present." (K4), with a correctness rate of 74.53%, "Various treatment options exist for wisdom teeth, including medications (antibiotics, traditional

Chinese medicine, etc.) and surgical procedures (incision and drainage, wisdom teeth extraction, etc.)." (K9), with a correctness rate of 78.40%, and "Wisdom teeth, also known as third molars, are the last and farthest-back teeth to emerge in the mouth. They typically surface in adults between the ages of 18 and 25 years." (K1), with a correctness rate of 80.93% (**Table 1**).

Table 1. Knowledge

| Knowledge | Correctness Rate N(%) |
|--|-----------------------------|
| K1. Wisdom teeth, also known as third molars, are the last and farthest-back teeth to emerge in the mouth. They typically surface in 125 (T | 2806 (80.93) |
| adults between the ages of 18 and 25 years. (True) K2. The primary issues associated with wisdom teeth are insufficient space and misalignment. (True) | 3106 (89.59) |
| K3. The emergence of wisdom teeth can lead to pain, inflammation, facial and jaw congestion, edema, and difficulty in swallowing. | 2826 (81.51) |
| (True) K4. In cases where the growth of wisdom teeth leads to a severe infection, fever may not necessarily be present. (False) | 2584 (74.53) |
| K5. Wisdom teeth are unlikely to cause damage to neighboring teeth, even if left untreated promptly. (False) | 3078 (88.78) |
| K6. The growth of wisdom teeth can create gaps that allow food debris to enter, resulting in a range of symptoms, including inflammation. (True) | 2906 (83.82) |
| K7. Consuming spicy, hard, and sticky foods can exert pressure on the teeth, leading to pain and swelling. Additionally, sugars in food and drinks can contribute to plaque buildup on teeth, causing dental caries and other oral problems. Thus, it is advisable to minimize their intake. | 3043 (87.77) |
| (True) K8. Not all patients require wisdom teeth extraction, particularly if they are growing normally and not causing any dental problems. (False) | 2871 (82.81) |
| K9. Various treatment options exist for wisdom teeth, including medications (antibiotics, traditional Chinese medicine, etc.) and surgical procedures (incision and drainage, wisdom teeth extraction, etc.). (True) | 2718 (78.40) |
| K10. Delaying the treatment of wisdom teeth may result in harm to neighboring teeth. (True) | 3078 (88.78) |

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| K11. Wisdom teeth extraction may cause temporary discomfort and | - |
|---|--------------|
| swelling, but it generally does not have any long-term effects on the | 2998 (86.47) |
| function and appearance of the mouth. (True) | |
| K12. Following the wisdom teeth extraction, patients should adhere | |
| to the prescribed regimen, which may include ice compresses, a | 3022 (87.16) |
| specific diet, and proper oral care, to alleviate pain. (True) | |
| K13. Wisdom teeth extraction always leads to a slimmer face. (False) | 2819 (81.31) |

A significant majority of the patients (93.86%) strongly agreed or agreed that they are willing to proactively engage in discussions with their doctor about their condition and receive professional medical support (A1). Similarly, a high percentage (92.70%) claimed that they believe in actively seeking medical treatment if they experience visible symptoms in their wisdom teeth (A5). Additionally, an overwhelming 90.51% of the patients expressed trust in the treatment plan proposed by an oral surgeon and demonstrated their willingness to heed the professional advice given by the oral surgeon (A7). However, it is worth noting that a considerable portion (58.23%) of the patients admitted to experiencing fear and anxiety when undergoing procedures related to wisdom teeth (A6). Additionally, 58.96% of the patients expressed fear concerning potential hazards associated with wisdom teeth (A4). Furthermore, 25.12% of the patients strongly agreed or agreed that the daily care or wisdom teeth extraction may demand a significant amount of time and energy, leading to a lack of willingness to prioritize it (A8). The decision-making process for undergoing wisdom teeth extraction is influenced by the reimbursement rates provided by medical insurance, as mentioned by 46.47% of the patients (A13). Additionally, 47.6% of the patients preferred medication as an intervention for wisdom teeth rather than opting for surgical procedures (A12). Interestingly, a substantial 80.3% of the patients expressed their

willingness to undergo prophylactic wisdom teeth extraction if recommended by their doctor (A11) (**Table 2**).

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| Fable 2. AttitudesImage: Strongly agree N(%)Neutral Strongly agree N(%)Disagree N(%)Disagree N(%)Strongly disagree N(%)A1. You are willing to proactively discuss your condition with your doctor and seek professional medical support. (Positive)1863 (53.75%)1391 (40.14%)99 (2.86%)99 (2.86%)Colspan="2">Colspan="2"Colspan="2">Colspan="2"Colspan="2 | | | | by copyright, including | jopen-2024-087110 | | |
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| condition with friends or family and seeking their advice on whether to retain or extract them. (Positive) A3. You are willing to acquire medical knowledge related to the risks and wisdom teeth extraction through concise online videos or books. (Positive) A4. You are concerned about potential hazards posed by wisdom teeth in your daily life, such as inflammation and infection. (Negative) A5. You firmly believe in seeking medical treatment if you experience visible symptoms related to your wisdom teeth. (Positive) A6. Undergoing wisdom teeth extraction would elicit feelings of fear or anxiety about the surgery. (Negative) A7. You place trust in your oral surgeon's treatment plan and are receptive to their professional advice. (Positive) A8. You consider the daily care or extraction of your wisdom teeth to he time consuming, and anarow A8. You consider the daily care or extraction of your wisdom teeth to the time consuming, and anarow A8. You consider the daily care or extraction of your wisdom teeth to the time consuming, and anarow A8. You consider the daily care or extraction of your wisdom teeth to the time consuming, and anarow A8. You consider the daily care or extraction of your wisdom teeth to the time consuming, and anarow A8. You consider the daily care or extraction of your wisdom teeth to the time consuming, and anarow A8. You consider the daily care or extraction of your windom teeth to the time consuming, and anarow A8. You consider the daily care or extraction of your windom teeth to the time consuming, and anarow A6. You place trust in your oral surgeon's treatment plan and are receptive to their professional advice. A8. You consider the daily care or extraction of your windom teeth to bair consuming, and anarow A8. You consider the daily care or extraction of your windom teeth to bair consuming, and anarow A6. You consider the daily care or extraction of your windom teeth to bair consuming, and anarow A8. You consider the daily care or extraction of your windom teeth to ban the top consuming and | condition with your doctor and seek professional medical support. (Positive) | | | es r | inse inse inse inse inse inse inse inse | | |
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| 4 5 6 7 8 | A9. You recognize the significance of a good diet and oral hygiene in preventing and managing wisdom teeth issues. (Positive) A10. You acknowledge the importance of regular | 1382 (39.87%) | 1550 (44.69%) | 345 (9.95%) | ing 5 1022 (3.52%) | 68 (1.96%) |
| 9 10 11 | oral check-ups in preventing wisdom teeth-related diseases. (Positive) | 1407 (40.57%) | 1727 (49.77%) | 201 (5.79%) | ecembe(2024) Enseigneme Enseigneme | 70 (2.02%) |
| 12 | | Yes | No | | | |
| 13 14 15 | A11. If the doctor recommends prophylactic wisdom teeth extraction, you would be willing to undergo the surgery. | 2784 (80.30%) | 683 (19.70%) | | Downloade Nt Superieu o text and c | |
| 16 17 18 19 | A12. You prefer medication over surgery as an intervention for wisdom teeth, viewing surgery as a last resort rather than a first-choice approach. | 1650 (47.60%) | 1817 (52.40%) | | id from http r (ABES) . lata mining, | |
| 20 21 22 23 24 | A13. The reimbursement rates of medical insurance for wisdom teeth extraction and related costs significantly influence your decision on whether to undergo the procedure. | 1403 (46.47%) | 2064 (59.53%) | | d from http://bmjopen.br (ABES) . ata mining, Al training, a | |
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Moreover, 83.89% of the patients reported (very confirming or confirming) that they are highly capable of evaluating the risks and benefits associated with wisdom teeth extraction, and they readily accept their dentist's treatment recommendations (P9). Additionally, 79.23% claimed that they utilize dental floss to clean the crevices that a toothbrush cannot effectively reach during oral cleaning (P5). Moreover, 74.70% of the patients asserted their ability to evaluate issues and make incremental adjustments concerning their experiences with wisdom teeth prevention or treatment (P11). However, the proportion of patients who confirmed their intention to inform their family or friends about the potential hazards of wisdom teeth and remind them to seek prompt medical attention or have their wisdom teeth extracted was only 33.89% (P8). Similarly, only 47.76% of the patients reported being consciously vigilant about their oral health by regularly visiting the dental clinic (P3) (**Table 3**).

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| | Table 3. Practices | Very conforming N(%) | Conforming N(%) | Neutral N(%) | <u> </u> | Very non-conforming N(%) |
|) 2 3 4 | P1: You will attend lectures on the topic of wisdom teeth and other oral health problems that can arise throughout your life, or you can acquire knowledge about the risks and wisdom teeth extraction through books and online resources. | 931 (26.88%) | 1100 (31.79%) | | ember 2024%) es related to text a 417 to text a | 216 (6.23%) |
| 3 | P2: If you are prescribed medication, it is essential to thoroughly read the instructions to comprehend its proper usage and potential adverse effects. | 858 (24.77%) | 1044 (30.16%) | 631 (18.23%) | oaded from http: prieur (ABES) - 639mining | 295 (8.53%) |
| | P3: Regularly, you conscientiously monitor your oral health by visiting the dental clinic. | 751 (21.70%) | 905 (26.14%) | 1041 (30.06%) | 567 4 1639%) | 203 (5.87%) |
| | P4: When brushing your teeth, use a soft toothbrush and pay careful attention to cleaning the back row of wisdom teeth, neighboring teeth, and gums. | 1140 (32.92%) | 1388 (40.08%) | | ning, and similar | 108 (3.12%) |
| | P5: To address areas that a toothbrush cannot effectively reach during oral cleaning, utilize dental floss to clean the crevices. | 1379 (39.83%) | 1368 (39.49%) | 345 (9.96%) | 256m7.40%) | 119 (3.44%) |
| | P6: As part of your routine, you regularly rinse your mouth with mouthwash to maintain good oral hygiene. | 1141 (32.95%) | 1446 (41.77%) | 384 (11.08%) | gies. (8.90%) | 188 (5.44%) |
| | P7: Regarding your diet, you are conscious of reducing the consumption of sugary or spicy foods, and you promptly clean food | 944 (27.32%) | 1277 (36.90%) | 822 (23.75%) | 278 (8.05%) ق | 146 (4.23%) |
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| debris through methods like brushing and flossing.P8: You will inform your family or friends about the hazards of wisdom teeth and remind them to seek medical attention or promptly have their wisdom teeth removed | 1062 (30.70%) | 113 (3.27%) | 895 (25.87%) | open-2024-087110 on 31 December %) Enseigneme by copyright, including for uses related t 274 | 123 (3.56%) |
| if necessary. P9: You are capable of evaluating the risks and benefits associated with wisdom teeth extraction and accepting your doctor's treatment recommendations. P10: You remain vigilant for symptoms | 1551 (44.79%) | 1354 (39.10%) | | o text and det from htsuperiour (ABES) 119 data mining 525 g | 47 (1.36%) |
| such as swollen gums, teeth pain, and a foul taste in the mouth. P11: You have the ability to evaluate issues and make adjustments gradually based on your experiences with wisdom teeth prevention or treatment. | 880 (25.43%) 1094 (31.61%) | 1117 (32.28%) 1496 (43.24%) | | 525 g 15 7%) Al training 167 g, and | 160 (4.63%) 77 (2.23%) |
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Discussion

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The correlation analysis showed that the knowledge score and the attitude score were positively correlated (r = 0.288, p<0.001), and the knowledge score and the practice score were also positively correlated (r = 0.348, p<0.001). Additionally, there was a positive correlation between attitude and practice scores (r = 0.452, p<0.001) (**Table**).

| Table 4. | Correlation | analysis |
|----------|-------------|----------|
| | | |

| | Knowledge | Attitudes | Practices |
|-----------|-----------------|-----------------|-----------|
| Knowledge | G | | |
| Attitudes | 0.288 (P<0.001) | 1 | |
| Practices | 0.348 (P<0.001) | 0.452 (P<0.001) | 1 |

The SEM was established to further investigate whether patients with impacted wisdom' knowledge and attitude toward wisdom teeth extraction affect their practice, whether attitude plays an intermediary role between knowledge and practice, and whether knowledge can directly affect their practice according to the KAP theory. It also investigated the effect of other factors including residence and monthly per capita household income on the three dimensions mentioned above (**Table S2**). The fitting index of the structural model (CMIN/DF = 13.905; RMSEA = 0.061; IFI = 0.847; TLI = 0.834; CFI = 0.847) outperformed the respective threshold value, signifying that the data fit the structural model satisfactorily (**Table S3**). The SEM demonstrated that knowledge had direct effects on attitudes, as indicated by a path coefficient of 2.042 (p<0.001) and a significant and attitudes had direct effects on practices, with a path coefficient of 1.460 (p<0.001) (**Figure 1**).

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Patients with impacted wisdom had sufficient knowledge, favorable attitudes, and proactive practices toward wisdom teeth extraction.

However, this study still identified deficiencies of certain aspects. Additionally, variances in KAP levels were observed across different demographic characteristics within the patients. These findings underscore the importance of considering these factors in the development of subsequent health education programs. The present study found that male and younger patients (<30 years) tend to have higher KAP scores. This finding is different from previous studies which reported higher oral health knowledge and behaviors among female and partipants older than 30 years [15, 16]. Nonetheless, the previous studies were not conducted in a Chinese population, and characteristics of their participants were distinctive different from participants in our study. Further education and tailored interventions should be designed for female and older patients in China. Furthermore, the present study identified that urban residents, those with higher education levels, non-smokers, non-drinkers, those who had not undergone dental treatment other than wisdom teeth removal, and those who were not informed and education about wisdom teeth during their dental treatment had lower KAP scores, and future programs should also consider the knowledge needs of these patients to enhance the dental care quality and the KAP towards wisdom teeth.

The present study found sufficient knowledge of wisdom teeth and that most patients would accept being educated about wisdom teeth during other oral therapies. patients had good knowledge about potential complications associated with wisdom teeth and the importance of treating wisdom teeth in a timely manner. This finding is consistent with previous knowledge and awareness studies conducted on medical students: a large percentage of the study population was aware of wisdom teeth impaction and its consequences[17, 18]. Patients in the present study had less knowledge about infection

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related to wisdom teeth and different treatment options. Hanna et al. have found that patients used the internet to seek information related to wisdom teeth, but internet use was not associated with better wisdom teeth knowledge[19]. Therefore, it is important for healthcare professionals to provide patients with accurate information and internet guidance to improve wisdom teeth knowledge. Zincir et al. reported that patients found educational videos related to wisdom teeth surgical removal were excellent for patient education, and educational videos in Chinese should be made available to improve patients' knowledge[20]. Increased awareness of hazards and removal of wisdom teeth among patients with impacted wisdom will help in the management of wisdom teeth[21].

In the present study, most patients had a positive attitude toward seeking professional advice and medical treatments, and they also trusted the treatment plan formulated by their oral surgeon. This result reflected a high level of patient trust in dentists, and the level of trust is higher than previously reported[22, 23]. This discrepancy can be explained by the larger proportion of patients with higher education in the present study[24]. Similar to previous findings, patients in the present study reported a high level of anxiety about the potential hazards of wisdom teeth and extraction surgery[25-27]. Lack of knowledge about the procedure is one of the possible contributors to anxiety related to oral surgery[27]. Effective education toward wisdom teeth extraction is critical in reducing anxiety in patients and improving the quality of care. Moreover, in the present study, medical insurance reimbursement rates were a decisive factor for wisdom teeth extraction, which is consistent with a previous study conducted in the United States[28]. Thus, there is a need to improve insurance coverage of wisdom teeth treatments to improve adherence to dentists' recommendations.

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Most patients claimed that they would weigh the risks and benefits of wisdom teeth extraction to make an informed decision, and around 80% would use dental floss regularly. Zhao et al. reported that very few Chinese adults use dental floss, and the patients with impacted wisdom in the present study might have better practice than the general population due to their disease experience and better dental knowledge[29]. Liu et al. reported that the rate of dental care visits and the utilization of oral health resources are low in the Chinese general population[30]. It is important to enhance patients' practice by improving their knowledge and attitude toward wisdom teeth extraction. Furthermore, this study found that patients who had prior wisdom teeth extraction demonstrated better knowledge, attitudes and practices compared to those without previous wisdom teeth extraction experience. Similarly, Brasileiro et al. also identified that patients with a history of teeth extraction and those without it presented different patterns of knowledge about wisdom teeth extraction [27]. Patients who had no experience with wisdom teeth extraction may need more attention to improve their KAP in this area.

The results of correlation analysis and SEM demonstrated that patients with impacted wisdom' knowledge had direct effects on attitudes, and attitudes had direct effects on practices. These implies that patients with impacted wisdom with better knowledge about wisdom teeth would have more favorable attitudes, which indirectly results in better practice toward wisdom teeth[31]. The finding highlighted the importance of education in patients with impacted wisdom to improve their knowledge, as well as their attitude and practice toward wisdom teeth. It also found that residence had direct effects on attitudes. This finding is consistent with previous studies on dental health and dental care utilization in China[30, 32, 33]. Patients with lower income and those who lived

in rural areas tend to have poorer knowledge and health-seeking behaviors, and more clinical and research attention should be paid to these patients.

This study has some limitations. The self-reported nature of the data collection may result in deviations between reported and actual practices. Meanwhile, the use of online surveys may introduce non-response bias. Nevertheless, this study also has considerable strengths. The large sample size enhances representativeness and generalizability of the results. Furthermore, this study provides an in-depth exploration of the relationship between patients with impacted wisdom' knowledge, attitudes, and practices regarding wisdom teeth extraction. These findings offer valuable insights to inform clinical guidance in this area.

Conclusions

In conclusion, this KAP study demonstrated sufficient knowledge, favorable attitudes, and proactive practices toward wisdom teeth extraction among patients with impacted wisdom. Further tailored interventions should be developed and implemented in this population to improve their KAP of wisdom teeth.

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Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of the School and Hospital of Stomatology, Cheeloo College of Medicine, Shandong University (Ethical No. 20230361), The medical ethics committee of Jinan Stomatological Hospital (JNSKQYY-2023-001) and Informed consent was obtained from all patients. I confirm that all methods were performed in accordance with the relevant guidelines. All procedures were performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analysed during this study are included in this published article.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

 conceived and designed the experiments: Jing Sun, Junru Meng, Shu Li, Dongdong Tong

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 2) performed the experiments: Jing Sun, Xin Wang, Bing Wang, Xiao Luan, Dongdong Tong

3) analyzed and interpreted the data: Jing Sun, Junru Meng, Xin Wang, Shu Li, Dongdong Tong

4) contributed reagents, materials, analysis tools or data: Jing Sun, Junru Meng, Xin

Wang, Bing Wang, Xiao Luan, Shu Li, Dongdong Tong

5) wrote the paper: Jing Sun, Junru Meng, Shu Li, Dongdong Tong

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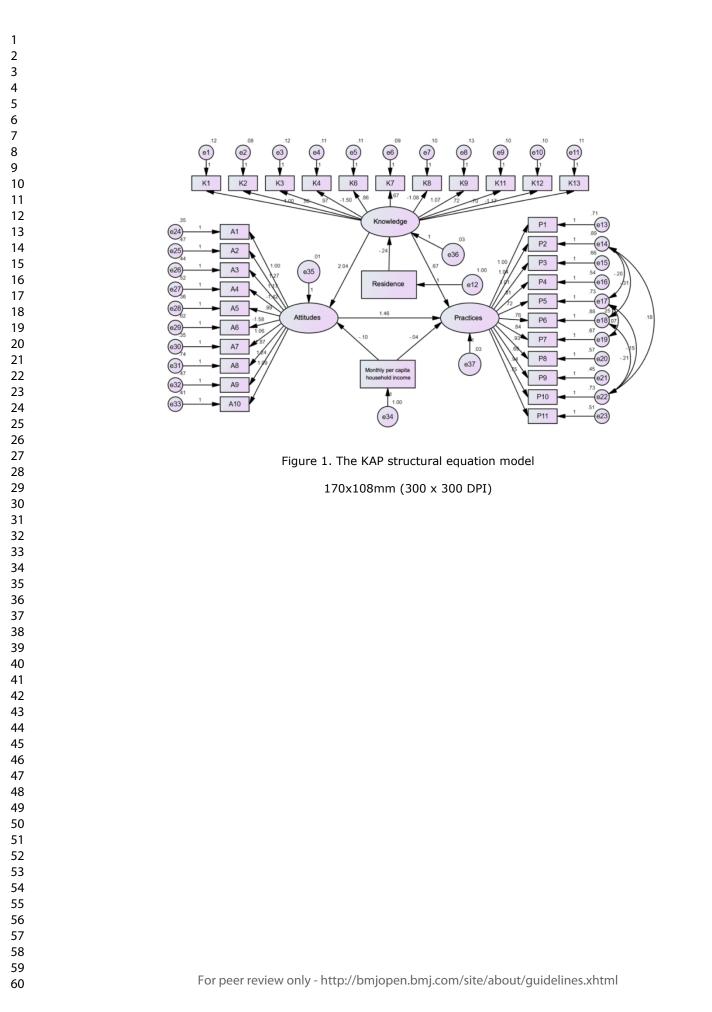
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Figure Legends

Figure 1. The KAP structural equation model

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Supplementary Tables

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| | Knowledge | | Attitudes | er 202 relater | Practices | |
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| 1208 (34.84) | 9.47±1.02 | | 39.02 ± 1.97 | l from (ABE ata mi | 48.55±5.59 | |
| 2259 (65.16) | 8.97±1.47 | | 37.47±2.91 | in http: S) · | 37.97±6.96 | |
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| 889 (25.64) | 9.39±1.19 | | 38.31 ±2.55 | .bmj. J, and | 42.46±7.30 | |
| 1051 (30.31) | 8.81±1.53 | | 37.02±2.77 | com/ | 36.62±6.06 | |
| 435 (12.55) | 8.37±1.36 | | 36.50±2.60 | on Ju lar teo | 34.01 ±4.13 | |
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| 10 11 12 | Postgraduate and above Occupation | 600 (17.31) | 8.56±1.51 | < 0.001 | 37.06±2.97 | | 35.08±5.34 | < 0.001 |
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| 17 18 19 20 | Personnel (e.g., teachers, doctors, engineers, writers, | 976 (28.15) | 9.54±1.03 | | 39.04±2.05 | | 47.84±5.90 | |
| 20 21 22 23 24 | etc.) General Employees and Support Staff | 473 (13.64) | 9.40±1.15 | | 38.41 ±2.50 | //bmjopen.t Al training, | 42.44±7.03 | |
| 24 25 26 27 28 | Commercial and Service Industry Workers | 345 (9.95) | 9.19±1.43 | | 37.72±2.75 | omj.com/ on and similar | 39.81 ±7.22 | |
| 29 30 31 32 33 34 35 | Agriculture,Forestry,AnimalHusbandry,Fisheries,andWaterResources Workers | 199 (5.74) | 8.89±1.45 | | 37.64±2.58 | from http://bmjopen.bmj.com/ on June 10, 2025 at Age (ABES) . ta mining, Al training, and similar technologies. | 37.77 ±6.75 | |
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| 8 9 | Equipment Operators | | | | | nbei nsei es re | | | |
| 10 | Military | 48 (1.38) | 8.90±1.74 | | 37.67±2.91 | · 202 Jatec | 37.29±6.83 | | |
| 11 12 | Student | 748 (21.57) | 8.71 ± 1.48 | | 36.85±3.00 | 4. D d to | 35.66±5.34 | | |
| 13 | Others | 265 (7.64) | 8.61 ± 1.62 | | 37.15±3.02 | own Sup text | 35.40±6.45 | | |
| 14 15 | Medical Insurance | | | | | load and | | | |
| 16 17 | No medical insurance | 306 (8.83) | | | | ed fr ur (A data | | | |
| 18 | Social medical insurance | 1283 (37.01) | | | | min BES | | | |
| 19 20 21 | Social and commercial medical insurance | 1878 (54.17) | | | | from http://bmjo耍n.bmj.com/ on June 10, 20褒 (ABES) . ta mining, Al traio,ng, and similar technologie令 | | | |
| 22 | Monthly per capita | | | < 0.001 | | | | < 0.001 | |
| 23 24 | household income (CNY) | | | <0.001 | $\mathbf{Q}_{\mathbf{A}}$ | ing, | | <0.001 | |
| 25 | <2,000 | 218 (6.29) | 9.33±0.95 | | 39.30±1.78 | and and | 51.41±3.98 | | |
| 26 27 | 2,000-5,000 | 682 (19.67) | 9.58±1.01 | | 39.14±1.84 | simila | 49.18±5.10 | | |
| 28 29 | 5,000-10,000 | 1263 (36.43) | 9.35 ± 1.25 | | 38.13±2.71 | n Jui r tec | 41.99±7.28 | | |
| 30 | 10,000-20,000 | 831 (23.97) | 8.78±1.50 | | 37.28±2.86 | ne 10 hno | 36.34±5.96 | | |
| 31 32 | >20,000 | 473 (13.64) | 8.51 ± 1.54 | | 36.74±2.96 | 0, 20 logi | 34.75 ± 5.03 | | |
| 33 | Smoking | | | < 0.001 | | | | < 0.001 | |
| 34 35 | Yes | 503 (14.51) | 9.40±0.99 | | 39.18±1.60 | at Agen | 50.80±3.47 | | |
| 36 | No | 2964 (85.49) | 9.10±1.40 | | 37.81±2.82 | | 40.10±7.79 | | |
| 37 | Alcohol consumption | | | < 0.001 | | <0.0 6 1 | | < 0.001 | |
| 38 39 | Yes | 656 (18.92) | 9.44±1.00 | | 39.26±1.78 | iblio | 50.25±4.43 | | |
| 40 | | | | | | ogral | | | |
| 41 42 | | | | | | Bibliographique es.xhtml de | | | |
| 43 | | For peer revi | ew only - http://bn | niopen.bmi.com | /site/about/guidelin | es.xhtml Q | | | |
| 44 45 | | | , incp///// | | ,, and and galacini | <u>0</u> | | | |
| 45 46 | | | | | | | | | |

| Page 35 of 48 | | | В | MJ Open | ijopen-20 1 by copy | |
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| 1 2 3 4 | | | | | jopen-2024-087110 on 31 De d by copyright, including for | |
| 5 | No | 2811 (81.08) | 9.07 ± 1.41 | 37.72±2.82 | ing 31 39.65±7.60 |) |
| 7 8 | Frequency of teeth brushing (per day) | | < | <0.001 | ⊆_ŏ | |
| 9 10 | 1 time | 550 (15.86) | 9.47±0.99 | 39.19 ± 1.78 | relate 50.02 ±4.79 |) |
| 11 12 | 2 times | 2391 (68.96) | 9.22±1.36 | 38.03±2.72 | eignement 50.02 ±4.79 50.02 ±4.79 41.32 ±7.78 | ; |
| 13 14 | 3 times | 469 (13.53) | 8.48 ± 1.45 | 36.71±3.00 | 14.54±4.76 |) |
| 15 | 4 times or more | 57 (1.64) | 8.35±1.38 | 36.46±2.47 | States <p< td=""><td>,</td></p<> | , |
| 16 17 18 19 20 | OralDiseaseComplications(multiplechoices) | | · . | 36.46±2.47 | from http: (ABES) . ta mining, | |
| 21 22 | Gum Disease | 986 (28.44) | | | bmjol VI train | |
| 23 24 | Dental Caries | 1536 (44.30) | | | pen.b | |
| 25 26 | Pulpitis | 689 (19.87) | | | and s | |
| 27 | Oral Cancer | 450 (12.98) | | | imila | |
| 28 29 | Oral ulcers | 700 (20.19) | | | n Jun | |
| 30 31 | Dentition defects | 348 (10.04) | | | //bmjopen.bmj.com/ on June 10, 2025 Al training, and similar technologies. | |
| 32 33 34 35 | Irregular teeth alignment | 1082 (31.21) | | | 2025 at Agence Bibliographique de gies. | |
| 35 | Loose teeth | 279 (8.05) | | | geno | |
| 37 38 | Other oral diseases | 276 (7.96) | | | е В. | |
| 39 | | | | | bliog | |
| 40 41 | | | | | yrapt | |
| 42 | | | | | nique | |
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< 0.001

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|---|----------------------------|------------------------|---------------|--------------------------|---|--------------------------|---------|
| No oral conditions as described above | 215 (6.20) | | | | ijopen-2024-087110 on 31 Dec 1 by copyright, including for u | | |
| Undergone wisdom teeth extraction | | | < 0.001 | | Sem∰ber EASeig √Sereig | | < 0.001 |
| Yes | 1790 (51.63) | 9.51±1.08 | | 38.90±2.33 | er 2024. Ignemei elated t | 46.45±6.87 | |
| No | 1677 (48.37) | 8.75±1.49 | | 37.05±2.78 | bottext ar | 36.53±6.25 | |
| If have, the age at that time (years old) | | | < 0.001 | | | | <0.001 |
| 20 and below | 350 (10.10) | 9.29±0.99 | | 39.39±1.91 | from <mark>h</mark> (ABES) Ita mini | 51.24±3.55 | |
| 21-30 30 and above | 855 (24.66) 585 (16.87) | 9.55±1.03 9.57±1.19 | | 39.19±2.18 38.19±2.61 | om http://bmjopen.bmj.com/ on June 10, 2025 BES) . mining, Al training, and similar technologies. | 47.72±6.08 41.73±6.68 | |
| If have, the reasons were (multiple choices): | | | | | ıjopen. raining ∕ | | / |
| Recurring painful inflammation | 1091 (31.47) | | | | bmj.con , and si | | |
| Get stuck between the teeth or cheek grinding | 903 (26.05) | | | | n/ on June milar techn | | |
| Dental caries or periodontal disease | 774 (22.32) | | | | ine 10, 2 chnolog | | |
| Prophylactic extractions or findings on check-ups | 912 (26.31) | | | | | | |
| Surgical requirements | 388 (11.19) | | | | at Agence Bibl | | |
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| Page 37 of 48 | | | | BMJ Open | | open- by cc | | |
|--|--|---------------|---------------------|----------------|------------------------|--|------------|--------|
| 1 2 3 4 5 6 7 8 9 10 | Other Undergone oral therapy other than treatment for wisdom teeth related oral diseases | 113 (3.26) | | <0.001 | | jopen-2024-087110 on 31 Dece册ber 2024. Downloaded fro E琛eignement Superieur (AB d by copyright, including for us쯗 related to text and data n | | <0.001 |
| 11 12 | Yes | 1780 (51.34) | 9.50±1.07 | | 38.89±2.34 | 24. Do ment S ed to te | 46.55±6.80 | |
| 13 14 15 | No | 1687 (48.66) | 8.76±1.50 | | 37.08±2.78 | wnloac Superic ext and | 36.49±6.22 | |
| 16 17 18 19 20 | Acceptance of being informed and educated about wisdom teeth during other oral therapies | | | <0.001 | | ⊖ning, | | <0.001 |
| 21 22 | Yes | 2540 (73.26) | 9.33±1.24 | | 38.41±2.58 | //bmjopen.l Al training | 43.97±7.86 | |
| 23 24 - | No | 927 (26.74) | 8.63±1.49 | | 36.89±2.79 | <u> </u> | 35.30±5.41 | |
| 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 | | For peer revi | ew only - http://bn | njopen.bmj.com | n/site/about/guideline | mj.com/ on June 10, 2025 at Agence Bibliographique de I and similar technologies. | | |

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|-------------------|--------------------------|------------------------|--|--|---------|
| Table S2. Test re | sults of the hypothesis. | | | jopen-2024-087110 on 31 1 by copyright, including 1 | |
| | Hypothesized paths | | | କ୍ଟିଟ୍ସ path & Defficient | P value |
| Hypothesis 1 | Knowledge | < | Residence | _@@## | < 0.001 |
| Hypothesis 2 | Attitudes | < | Knowledge | edate 1 | < 0.001 |
| Hypothesis 3 | Attitudes | < | Monthly per capita househol | r2024, Downloaded from htttg//bmjogen.bn inement Superieur (A時的), 6 inted to text and data miningr Al train仍有, a | <0.001 |
| Hypothesis 4 | Practices | < | Attitudes | ta min | < 0.001 |
| Hypothesis 5 | Practices | < | Knowledge | ing.666 | 0.104 |
| Hypothesis 6 | Practices | < | Monthly per capita househol | ld -(50, a | 0.052 |
| | | | | nd similar technologies. | |
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| Table S3. Model fitness indices for t | he KAP structural equation model | Jopen-2024-087110 on 31 Desaurement value by copyright, including for uses related to t |
| Goodness-of-Fit Indices | Ideal standards | ទួ Maasurement value |
| CMIN/DF | 1-3 excellent, 3-5 good | |
| RMSEA | <0.08 good | |
| IFT | >0.8 good | ont D ext ext 47 |
| TLI | >0.8 good | and compared an |
| CFI | >0.8 good | data mining a set field a set |
| | lex. | //bmjopen.bmj.com/ on June 10, 2025 Al training, and similar technologies. |
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| 5. Occupation 5. Occupation a. State Organ and Engineers, writers, etc. General Employeer | nical second by school dergraduate for above hterprise Iseacers |
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| Part I Demographic information 1. Gender a. Male b. Female b. Female 2. Age, years | ding for uses related to text and data methods below text and data methods discussed by school dergraduate Attacks |
| Part I Demographic information 1. Gender a. Male b. Female b. Female 2. Age, years | reignement 2024. Downloaded to text and data from y school lelow mice from y school lergraduate At tage bove At tage |
| Part I Demographic information 1. Gender a. Male b. Female b. Female 2. Age, years | reignement 2024. Downloaded to text and data from y school lelow mice from y school lergraduate At tage bove At tage |
| 1. Gender a. Male b. Female b. Female 2. Age, years | reignement 2024. Downloaded to text and data from y school lelow mice from y school lergraduate At tage bove At tage |
| 1. Gender a. Male b. Female b. Female 2. Age, years | ated to text and data metric below and data metric l below and data metric l below ate metric hical second data metric above At taba above taba |
| 2. Age, years | to the superior of the superio |
| 2. Age, years | to the superior of the superio |
| 3. Residence a. Rural b. Urban b. Urban 4. Education a. Middle school and b. High school/Tech c. Junior college/Und c. Junior college/Und d. Postgraduate and a 5. Occupation a.State Organ and En b. Professional and engineers, writers, et c. General Employee c.General Employee | below ta monoporte school dergraduate from the school dergraduate from t |
| b. Urban 4. Education a. Middle school and b. High school/Technic b. High school/Technic c. Junior college/Und d. Postgraduate and and 5. Occupation a.State Organ and End b. Professional and engineers, writers, etd c. General Employee c.General Employee | below a bove hterprise I below hterprise I below |
| 4. Education a. Middle school and b. High school/Tech c. Junior college/Und c. Junior college/Und d. Postgraduate and a 5. Occupation a.State Organ and En b. Professional and engineers, writers, et c. General Employee c.General Employee | below a bove hterprise I below hterprise I below |
| 5. Occupation b. High school/Tech b. High school/Tech c. Junior college/Und d. Postgraduate and a a.State Organ and En b.Professional and engineers, writers, et c.General Employee | nical second lergraduate above A nterprise Iseaters |
| 5. Occupation c. Junior college/Und d. Postgraduate and a a.State Organ and En b.Professional and engineers, writers, et c.General Employee | lergraduate. \vec{e} above iterprise leaders |
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| b.Professional and engineers, writers, et c.General Employee | — • <u>~</u> |
| engineers, writers, et c.General Employee | \mathbf{T} 1 \mathbf{T} \mathbf{D} |
| c.General Employee | Technica Personnel (e.g., teachers, doctors, |
| | |
| d Commercial and S | |
| | ervice Indestry Workers |
| Resources Workers | try, Aningal Husbandry, Fisheries, and Water |
| | neport Foringent Operators |
| o Military | nsport Equipment Operators |
| h.Student | 0 |
| I.Others | rt Age |
| a No medical insura | |
| 6. Medical Insurance: b. Social medical insura | |
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| | c. Social and commercial med ansurance |
| 7. Monthly per capita household income (CNY) | |
| | b. 2,000-5,000 |
| | c. 5,000-10,000 |
| | a. <2,000 Pruses related to 2024 |
| | e. >20,000 |
| 8. Smoking | a. Yes |
| | a. Yes te suppo b. No aprice |
| 9. Alcohol consumption | a. Yes deur d |
| | b. No ¹⁰ A ft |
| 10. Frequency of teeth brushing (per day) | a. 1 time b. 2 times c. 3 times d. 4 times or more |
| | b. 2 times |
| | c. 3 times |
| | d. 4 times or more |
| 11. Oral Disease Complications | a. Gum Disease |
| | b. Dental Caries |
| | c. Pulpitis |
| | d. Oral Cancer |
| | e. Oral ulcers |
| | f. Dentition defects |
| | g. Irregular teeth alignment |
| | a. Gum Disease b. Dental Caries c. Pulpitis d. Oral Cancer e. Oral ulcers f. Dentition defects g. Irregular teeth alignment h. Loose teeth |
| | i. Other oral diseases |
| | j. No oral conditions as described bove |
| 12. Undergone wisdom teeth extraction | a. Yes B |
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| | b. No g v | _ |
| 12.1 If have, the age at that time (years old) | | _ |
| 12.2 If have, the reasons were: | a. Recurring painful inflamma | - |
| | b. Get stuck between the teethape dieek grinding | |
| | c. Dental caries or periodontal | |
| | d. Prophylactic extractions or builtings on check-ups | |
| | e. Surgical requirements | |
| | e. Surgical requirements | |
| 13. Undergone oral therapy other than treatment for wisdom teeth related | a. Yes | _ |
| oral diseases | b. No | |
| 14. Acceptance of being informed and educated about wisdom teeth | 2. Mag | - |
| during other oral therapies | b. No g, · · · | |
| | Al training, and similar technologies. Al promj.com/site/about/guidelines.xhtml | |
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| | | inclu | |
| | Part II Knowledge | on 3 | |
| | K1. Wisdom teeth, also known as third molars, are the last and farthest-back teeth to | 31 Dec 1 1g for u | |
| | emerge in the mouth. They typically surface in adults between the ages of 18 and 25 | Sшg | |
| | years. | A.Yes | B.No |
| | K2. The primary issues associated with wisdom teeth are insufficient space and | ner ate | |
| | misalignment. | A.Yes 5 m | B.No |
| | K3. The emergence of wisdom teeth can lead to pain, inflammation, facial and jaw | A.Yes an | |
| | congestion, edema, and difficulty in swallowing. | A.Yes a co | B.No |
| | K4. In cases where the growth of wisdom teeth leads to a severe infection, fever may | d data m A.Yes a m | D.M. |
| | not necessarily be present. | A. Yes a ≥ F | B.No |
| | K5. Wisdom teeth are unlikely to cause damage to neighboring teeth, even if left | A.Yesg. | B.No |
| | untreated promptly. K6. The growth of wisdom teeth can create gaps that allow food debris to enter, | | D.INO |
| | resulting in a range of symptoms, including inflammation. | Al train A.Yesini | B.No |
| | K7. Consuming spicy, hard, and sticky foods can exert pressure on the teeth, leading | | 2110 |
| | to pain and swelling. Additionally, sugars in food and drinks can contribute to plaque | , ang | |
| | buildup on teeth, causing dental caries and other oral problems. Thus, it is advisable | ng, and simila A.Yes | |
| | to minimize their intake. | A.Yes a | B.No |
| | K8. Not all patients require wisdom teeth extraction, particularly if they are growing | | |
| | normally and not causing any dental problems. | A.Yesol | B.No |
| | K9. Various treatment options exist for wisdom teeth, including medications | 0, 2025 logies. | |
| | (antibiotics, traditional Chinese medicine, etc.) and surgical procedures (incision and | 0 | |
| | drainage, wisdom teeth extraction, etc.). | A.Yes | B.No |
| | K10. Delaying the treatment of wisdom teeth may result in harm to neighboring teeth. | gence | |
| | KTO. Delaying the treatment of wisdom teeth may result in harm to herghboring teeth. | | B.No |
| | | A.Yes Bi iographique t/guidelines.xhtml de | |
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| 4 5 6 | K11. Wisdom teeth extraction may cause temporary discomfort and swelling, but it generally does not have any long-term effects on the function and appearance of the | 0 on 31 December Iuding for uses re A.Yes re | | |
| 7 8 | mouth. | A.Yes s g g g | B.No | |
| 9 | K12. Following the wisdom teeth extraction, patients should adhere to the prescribed | nber s reig | | |
| 10 | regimen, which may include ice compresses, a specific diet, and proper oral care, to | at ne 20 | | |
| 11 12 | alleviate pain. | A. Yes to ment | B.No | |
| 13 | K12 Window tooth autmation always loads to a alignment face | t Sul | | |
| 14 15 | K13. Wisdom teeth extraction always leads to a slimmer face. | t Superie text and A.Yes and | B.No | |
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| | Part II | I Attitudes | | 1 Dece | | |
| | A1. You are willing to proactively discuss your condition with your doctor and seek professional medical support. | a.Strongly agree | b.Agree | c. Norreign c. Norreign | d.Disagree | e.Strongly Disagree |
| | A2. You are open to discussing your wisdom teeth condition with friends or family and seeking their advice on whether to retain or extract them. | a.Strongly agree | b.Agree | 20124. Downl netteent Sup ated to text a د. N | d.Disagree | e.Strongly Disagree |
| | A3. You are willing to acquire medical knowledge related to the risks and wisdom teeth extraction through concise online videos or books. | a.Strongly agree | b.Agree | nloaded from iperfeur (ABE c. N data mi | d.Disagree | e.Strongly Disagree |
| | A4. You are concerned about potential hazards posed by wisdom teeth in your daily life, such as inflammation and infection. | a.Strongly agree | b.Agree | | d.Disagree | e.Strongly Disagree |
| | A5. You firmly believe in seeking medical treatment if you experience visible symptoms related to your wisdom teeth. | a.Strongly agree | b.Agree | c. Negutral | d.Disagree | e.Strongly Disagree |
| | A6. Undergoing wisdom teeth extraction would elicit feelings of fear or anxiety about the surgery. | a.Strongly agree | b.Agree | c. Neutral | d.Disagree | e.Strongly Disagree |
| | A7. You place trust in your oral surgeon's treatment plan and are receptive to their professional advice. | a.Strongly agree | b.Agree | c. Notice on the contract of t | d.Disagree | e.Strongly Disagree |
| 1 | A8. You consider the daily care or extraction of your wisdom teeth to be time-consuming and energy-demanding, hence, you do not prioritize it. | a.Strongly agree | b.Agree | الله 10, 20 edinologie c. Nologie | d.Disagree | e.Strongl Disagree |
| | A9. You recognize the significance of a good diet and oral hygiene in preventing and managing wisdom teeth issues. | a.Strongly agree | b.Agree | c. Neutrat Ag | d.Disagree | e.Strongly Disagree |
| | A10. You acknowledge the importance of regular oral check-ups in preventing wisdom teeth-related diseases. | a.Strongly agree | b.Agree | c. Neutrad | d.Disagree | e.Strongly Disagree |
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| 1 2 3 | | jopen-2024-087110 o 1 by copyright, includ | |
| 4 5 6 | A11. If the doctor recommends prophylactic wisdom teeth a.Yes b.No extraction, you would be willing to undergo the surgery. | | |
| 7 8 9 10 | A12. You prefer medication over surgery as an intervention for a.Yes b.No | use use | |
| 11 12 13 14 15 | wisdom teeth, viewing surgery as a last resort rather than a first- choice approach. | .4. Downloan nent Superie d to text and | |
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| 5 4 | including 3 |
| 5 | |
| 6 7 | Part IV Practice |
| 8 | P1: You will attend lectures on the topic of wisdom teeth and other oral health problems that can arise the new books and wisdom tooth extraction through books and online resources |
| 9 | knowledge about the risks and wisdom teem extraction through books and online resources. |
| 10 11 | a. Very conforming |
| 12 | |
| 13 | c. Neutral |
| 14 15 | d. Non-conforming |
| 16 | e. Very non-conforming |
| 17 | P2: If you are prescribed medication, it is essential to thoroughly read the instructions to comprehend $\frac{1}{2}$ proper usage and potential adverse |
| 18 19 | effects. |
| 20 | a. Very conforming |
| 21 | b. Conforming c. Neutral |
| 22 23 | |
| 24 | d. Non-conforming e. Very non-conforming |
| 25 | |
| 26 27 | P3: Regularly, you conscientiously monitor your oral health by visiting the dental clinic. a. Very conforming b. Conforming c. Neutral |
| 28 | b. Conforming |
| 29 | c. Neutral |
| 30 31 | d. Non-conforming |
| 32 | b. Conforming c. Neutral d. Non-conforming e. Very non-conforming · |
| 33 | P4: When brushing your teeth, use a soft toothbrush and pay careful attention to cleaning the back row of window teeth, neighboring teeth, and |
| 34 35 | |
| 36 | a. Very conforming |
| 37 | b. Conforming |
| 38 39 | |
| 40 | ý gra |
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| 42 43 | gums. a. Very conforming b. Conforming For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml |
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| | in cluc |
| c. Neutral | |
| d. Non-conforming | |
| e. Very non-conforming | |
| P5: To address areas that a too | othbrush cannot effectively reach during oral cleaning, utilize dental floss the crevices. |
| a. Very conforming | anemo lated |
| b. Conforming | |
| c. Neutral | tes several sev |
| d. Non-conforming | t an log |
| e. Very non-conforming | |
| P6: As part of your routine, yo | ou regularly rinse your mouth with mouthwash to maintain good oral hygi |
| a. Very conforming | |
| b. Conforming | ng, g |
| c. Neutral | |
| d. Non-conforming | i i i i i i i i i i i i i i i i i i i |
| e. Very non-conforming | |
| P7: Regarding your diet, you | are conscious of reducing the consumption of sugary or spicy foods, and y are comptly clean food debris through |
| methods like brushing and flo | issing. |
| a. Very conforming | |
| b. Conforming | |
| c. Neutral | une 10, 202 |
| d. Non-conforming | |
| e. Very non-conforming | |
| P8: You will inform your fam | ily or friends about the hazards of wisdom teeth and remind them to seek mediaal attention or promptly have their |
| wisdom teeth removed if nece | essary. |
| a. Very conforming | essary. |
| b. Conforming | |
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| 1 2 3 4 | BMJ Open BMJ |
| 5 | c. Neutral |
| 6 | d. Non-conforming |
| 7 8 | e. Very non-conforming |
| 9 | P9: You are capable of evaluating the risks and benefits associated with wisdom teeth extraction and accepting your doctor's treatment |
| 10 | recommendations. |
| 11 12 | a. Very conforming |
| 13 | b. Conforming |
| 14 | c. Neutral |
| 15 | d. Non-conforming |
| 16 17 | e. Very non-conforming |
| 18 | P10: You remain vigilant for symptoms such as swollen gums, teeth pain, and a foul taste in the mouth. |
| 19 | a. Very conforming |
| 20 21 | b. Conforming |
| 22 | b. Conforming c. Neutral d. Non-conforming |
| 23 | d. Non-conforming |
| 24 | a Very non conforming |
| 25 26 | P11: You have the ability to evaluate issues and make adjustments gradually based on your experiences with wisdom teeth prevention or treatment. a. Very conforming b. Conforming c. Neutral d. Non-conforming e. Very non-conforming |
| 27 | treatment. |
| 28 | a. Very conforming |
| 29 30 | b. Conforming |
| 31 | c. Neutral |
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Knowledge, attitudes, and practices among patients with impacted wisdom teeth toward teeth extraction in Jinan, Shandong Province, China: A Cross-Sectional Study

| Shandong University & Shandong Key Laboratory of Oral Tissue Regeneration & Shandong Engineering Research Center of Dental Materials and Oral Tissue Regeneration & Shandong Provincial Clinical Research Center for Oral Diseases, Department of Periodontology Tong, Dongdong; School and Hospital of Stomatology, Cheeloo College of | Journal: | BMJ Open |
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Knowledge, attitudes, and practices among patients with impacted wisdom teeth toward teeth extraction in Jinan, Shandong Province, China: A Cross-Sectional Study

Running Title: KAP toward wisdom teeth extraction

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ABSTRACT

Objectives: This study aimed to assess the knowledge, attitudes, and practices (KAP) of patients with impacted wisdom teeth toward tooth extraction, with the intention of identifying both gaps and opportunities for improved dental health education and practices.

Design: A cross-sectional study utilizing a web-based questionnaire.

Setting: The study was conducted at the Department of Oral and Maxillofacial Surgery, School and Hospital of Stomatology, Cheeloo College of Medicine, Shandong University, and Jinan Stomatological Hospital.

Participants: This study included responses from 3,467 individuals presenting with impacted wisdom teeth at the study settings between March and May 2023.

Primary and Secondary Outcome Measures: The primary outcomes measured were the levels of knowledge, attitudes, and practices toward wisdom teeth extraction among participants. The knowledge was assessed on a scale of 0-11, attitudes on a scale of 10-50, and practices on a scale of 11-55. Secondary outcomes included the exploration of associations between knowledge, attitudes, and practices using structural equation modeling.

Results: Participants demonstrated a mean knowledge score of 9.1 ± 1.4 , mean attitude score of 38.0 ± 2.7 , and mean practice score of 41.7 ± 8.2 . The analysis using a structural equation model revealed a direct effect of knowledge on attitudes (path coefficient = 2.042, p<0.001) and a direct effect of attitudes on practices (path coefficient = 1.460, p<0.001).

Conclusions: The findings suggest that patients with impacted wisdom teeth possess adequate knowledge and favorable attitudes towards teeth extraction, which positively

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> influences their practices. However, tailored interventions are still needed to further enhance KAP regarding this procedure in this population.

Strengths and limitations of this study

- Large sample size enhances the representativeness of findings.
- Structural equation modeling strengthens analysis of relationships between KAP factors.
- The online survey method enables convenient, large-scale data collection.
- Reliance on self-reported data may introduce reporting bias.
- Exclusive use of online surveys could result in non-response bias.

Keywords: Knowledge; Attitude; Practice; Cross-Sectional Study; Wisdom teeth;

 Impacted wisdom teeth constitute a significant public health issue due to their high prevalence and the associated complications¹. Epidemiological evidence indicates that a substantial proportion of the adult population will develop at least one impacted wisdom teeth, necessitating extraction to mitigate potential risks such as infection, crowding, and other dental pathologies^{1, 2}.

Nevertheless, the extraction procedure for impacted wisdom teeth poses numerous challenges. It is well-documented that these procedures can elicit significant psychological stress in patients, resulting in dental anxiety or phobia³. This stress is exacerbated by the complexity and invasiveness inherent in the extraction of impacted teeth, which can amplify patients' apprehensions and uncertainties concerning dental care^{4, 5}. Such anxiety and uncertainty negatively may negatively influence patients' attitudes towards dental health and treatment, potentially leading to suboptimal dental health behaviors, delayed care-seeking, and consequently, poorer dental and overall health outcomes^{6, 7}.

Knowledge-Attitude-Practice (KAP) model suggests that an individual's knowledge significantly influences their attitudes towards health and illness, which, in turn, shapes their health-related behaviors^{8, 9}. Despite the recognition of dental anxiety among patients with impacted wisdom teeth, there exists a notable gap in the research literature regarding the application of the KAP model to better understand and address this issue. Previous research efforts have been directed towards delineating the prevalence of dental anxiety and its determinants within this demographic^{3, 10, 11}, with insufficient

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focus on elucidating how knowledge and attitudes concerning wisdom teeth impaction and extraction affect health behaviors.

Thus, this study aims to address this gap by leveraging the KAP framework to investigate the knowledge, attitudes, and practices toward wisdom teeth extraction among patients with impacted wisdom tooth.

Materials and Methods

Study design and participants

This cross-sectional study was conducted between March and May 2023 at the Department of Oral and Maxillofacial Surgery, School and Hospital of Stomatology, Cheeloo College of Medicine, Shandong University and Jinan Stomatological Hospital. The inclusion criteria were as follows: 1) patients diagnosed with impacted wisdom tooth either at the Department of Oral and Maxillofacial Surgery, School and Hospital of Stomatology, Cheeloo College of Medicine, Shandong University, and 2) patients proficient in the Chinese to ensure effective communication during the data collection. Conversely, those who reported prior participation in similar studies were excluded from this study. Ethical approval was approved by the Ethics Committee of the School and Hospital of Stomatology, Cheeloo College of Medicine, Shandong University (Ethical No. 20230361), The medical ethics committee of Jinan Stomatological Hospital (JNSKQYY-2023-001) and informed consent was obtained from all patients. **Ouestionnaire introduction and data collection**

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The questionnaire was designed with reference to relevant guidelines and previous literature^{12, 13}, and was revised by two chief physicians and one vice-chief physician. A pilot test was conducted (n=34) and Cronbach's α coefficient value was 0.819, indicating a good internal consistency.

The final questionnaire contains four dimensions: demographic characteristics, knowledge, attitudes and practices. The knowledge dimension consists of 13 questions, with 1 point for a correct answer and 0 points for the rest. Given that the necessity of wisdom teeth extraction is a common misconception among patients, often due to a lack of understanding of guideline recommendations, question K8 was designed to address this issue. Questions K5 and K10 were designed as trap questions, presenting exactly opposite meanings^{14, 15}. patients who selected "right" or "wrong" for both questions were deemed to have a logical conflict and were excluded from the survey. Consequently, the knowledge scores ranged from 0 to 11 points. The attitudes dimension consists of 13 questions, wherein questions A11-A13 are designated exclusively for descriptive analysis purposes. The remaining questions utilized a 5point Likert scale, ranging from very positive (5 points) to very negative (1 point), yielding a possible score range of 10-50 points. The practices dimension consists of 11 questions using a 5-point Likert scale as well, ranging between very conforming (5 points) to very non-conforming (1 point), with a possible score range of 11-55 points. Both electronic and printed versions of the questionnaire were utilized in this study. The electronic questionnaire hosted the Sojump platform was on (http://www.sojump.com), an online survey platform. At the onset of the survey,

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patients were required to indicate their consent by clicking the option "I agree to participate in this study" before proceeding to respond to the questions. The data collection process ensured participant anonymity. Additionally, an IP restriction was implemented to prevent duplication of responses, restricting participants to a single submission from each unique IP address. To accommodate individuals who may be less acquainted with electronic devices, such as elderly patients, printed questionnaires were made available during their clinic visit, and they were requested to complete the printed forms. During questionnaire distribution, five trained research assistants first introduced the study face-to-face to patients before distributing the questionnaires. They also provided assistance when necessary, reviewed questionnaire completeness, and asked the patients to complete any missing information.

Statistical analysis

STATA 17.0 (STATA Corporation, College Station, TX, USA) was utilized for statistical analyses. Continuous variables were presented as mean±standard deviation (SD) and were compared using the student's t-test or one-way analysis of variance (ANOVA). Categorical variables were presented as numbers (percentages). In this study, 70% of the total score was used as the cut-off value, that means the threshold for sufficient knowledge, favorable attitudes, and proactive practices were 7.7, 35 and 38.5 points respectively¹⁶. Pearson correlation was used to analyze the correlation between knowledge, attitudes, and practices. Variables with p<0.02 in the single-factor logistic regression analysis are included in the multivariate logistic regression analysis. AMOS 24.0 (IBM, NY, USA) was utilized to construct a structural equation model (SEM)

examining the knowledge, attitudes, and practices of patients with impacted wisdom teeth toward wisdom teeth extraction. This SEM tested the main hypotheses as follows: 1) knowledge had direct effects on attitudes, 2) knowledge had direct effects on practices, and 3) attitudes had direct effects on practices. Model fit was evaluated using CMIN/DF (Chi-square goodness-of-fit test/Degrees of Freedom), RMSEA (Root Mean Square Error of Approximation), IFI (Incremental Fixation Index), TLI (Tucker-Lewis index) and CFI (Comparative Fixation Index). A two-sided p-value <0.05 was considered statistically significant.

Results

A total of 3467 patients participated in this study. Among them, 1092 (31.50%) were aged 30 or below, 2259 (65.16%) were female, 2927 (84.42%) lived in urban areas, and 2391 (68.96%) brushed their teeth twice daily. In addition, 1790 (51.63%) had undergone wisdom teeth extraction. The mean scores for knowledge, attitudes, and practices were 9.1 ± 1.4 (possible range: 0-11), 38.0 ± 2.7 (possible range: 10-50), and 41.7 ± 8.2 (possible range: 11-55), respectively (**Table S1**).

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The three knowledge items with the highest correctness rates were "The primary issues associated with wisdom teeth are insufficient space and misalignment." (K2), with a correctness rate of 89.59%, "Wisdom teeth are unlikely to cause damage to neighboring teeth, even if left untreated promptly." (K5), with a correctness rate of 88.78%, and "Delaying the treatment of wisdom teeth may result in harm to neighboring teeth." (K10), with a correctness rate of 88.78%. The three items with the lowest correctness

> rates were "In cases where the growth of wisdom teeth leads to a severe infection, fever may not necessarily be present." (K4), with a correctness rate of 74.53%, "Various treatment options exist for wisdom teeth, including medications (antibiotics, traditional Chinese medicine, etc.) and surgical procedures (incision and drainage, wisdom teeth extraction, etc.)." (K9), with a correctness rate of 78.40%, and "Wisdom teeth, also known as third molars, are the last and farthest-back teeth to emerge in the mouth. They typically surface in adults between the ages of 18 and 25 years." (K1), with a correctness

rate of 80.93% (**Table 1**).

Table 1. Knowledge

| Knowledge | | Correctness Rate N(%) |
|---|-----------------------|-----------------------------|
| K1. Wisdom teeth, also known as third molar | s, are the last and | |
| farthest-back teeth to emerge in the mouth. They | typically surface in | 2806 (80.93) |
| adults between the ages of 18 and 25 years. (True | · | |
| K2. The primary issues associated with wisdom t | eeth are insufficient | 3106 (89.59) |
| space and misalignment. (True) | | 5100 (05.55) |
| K3. The emergence of wisdom teeth can lead to | | |
| facial and jaw congestion, edema, and difficu | lty in swallowing. | 2826 (81.51) |
| (True) | | |
| K4. In cases where the growth of wisdom teet | | 2584 (74.53) |
| infection, fever may not necessarily be present. (I | | () |
| K5. Wisdom teeth are unlikely to cause damage to | o neighboring teeth, | 3078 (88.78) |
| even if left untreated promptly. (False) | | |
| K6. The growth of wisdom teeth can create gaps th | | / |
| to enter, resulting in a range of symptoms, inclu | iding inflammation. | 2906 (83.82) |
| (True) | | |
| K7. Consuming spicy, hard, and sticky foods can e | 1 | |
| teeth, leading to pain and swelling. Additionally, | - | |
| drinks can contribute to plaque buildup on teeth, c | - | 3043 (87.77) |
| and other oral problems. Thus, it is advisable to m | inimize their intake. | |
| (True) | | |
| K8. Not all patients require wisdom teeth extract | · - · | |
| they are growing normally and not causing an | y dental problems. | 2871 (82.81) |
| (False) | | |

| K9. Various treatment options exist for wisdom teeth, including | |
|---|--------------|
| medications (antibiotics, traditional Chinese medicine, etc.) and | 2718 (78.40) |
| surgical procedures (incision and drainage, wisdom teeth extraction, | 2710(70.40) |
| etc.). (True) | |
| K10. Delaying the treatment of wisdom teeth may result in harm to | 3078 (88.78) |
| neighboring teeth. (True) | 3078 (88.78) |
| K11. Wisdom teeth extraction may cause temporary discomfort and | |
| swelling, but it generally does not have any long-term effects on the | 2998 (86.47) |
| function and appearance of the mouth. (True) | |
| K12. Following the wisdom teeth extraction, patients should adhere | |
| to the prescribed regimen, which may include ice compresses, a | 3022 (87.16) |
| specific diet, and proper oral care, to alleviate pain. (True) | |
| K13. Wisdom teeth extraction always leads to a slimmer face. (False) | 2819 (81.31) |

A significant majority of the patients (93.86%) reported that they are willing to proactively engage in discussions with their doctor about their condition and receive professional medical support (A1). Similarly, a high percentage (92.70%) claimed that they believe in actively seeking medical treatment if they experience any visible symptoms in their wisdom teeth (A5). Additionally, an overwhelming 90.51% of the patients expressed trust in the treatment plan proposed by an oral surgeon and demonstrated willingness to heed the professional advice given by the oral surgeon (A7). However, it is worth noting that a considerable portion (58.23%) of the patients admitted to experiencing fear and anxiety regarding procedures related to wisdom teeth (A6). Additionally, 58.96% of the patients expressed fear concerning potential hazards associated with wisdom teeth (A4). In addition, 25.12% of the patients strongly agreed or agreed that the daily care or wisdom teeth extraction requires a significant amount of time and energy, leading to a lack of willingness to prioritize it (A8). The decisionmaking process for undergoing wisdom teeth extraction is influenced by the reimbursement rates provided by medical insurance, as mentioned by 46.47% of the

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patients (A13). Additionally, 47.6% of the patients preferred medication as an intervention for wisdom teeth rather than opting for surgical procedures (A12). Notably, a substantial 80.3% of the patients expressed their willingness to undergo prophylactic wisdom teeth extraction if recommended by their doctor (A11) (**Table 2**).

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| Table 2. Attitudes | | | by copyrignt, including | jopen-2024-087110 on 3 | |
| <u></u> | Strongly agree N(%) | Agree N(%) | Neutral of N(%) | Disagree | Strongly disa N(%) |
| A1. You are willing to proactively discuss y condition with your doctor and seek profession medical support. (Positive) | | 1391 (40.14%) | 99 (2.86%) | nseignen (2.34%) | 33 (0.95%) |
| A2. You are open to discussing your wisdom te condition with friends or family and seeking the advice on whether to retain or extract the (Positive) | heir 1144 (32 97%) | 1664 (48.00%) | 424 (12.23%) | ent Superieu Superieu | 57 (1.64%) |
| A3. You are willing to acquire medical knowled related to the risks and wisdom teeth extract through concise online videos or books. (Positive | tion 1180 (34.06%) | 1878 (54.18%) | 216 (6.23%) | r A from 4 (3.29%) | 79 (2.28%) |
| A4. You are concerned about potential hazards po by wisdom teeth in your daily life, such inflammation and infection. (Negative) | as 644 (18.56%) | 1400 (40.39%) | م 1017 (29.33% | 20 (9.22%) | 86 (2.48%) |
| A5. You firmly believe in seeking medical treatm if you experience visible symptoms related to y wisdom teeth. (Positive) | our 1884 (54.41%) | 1330 (38.38%) | 124 (3.57%) | ₽ ₽ ₽ ₽ ₽ 17 (3.38%) | 12 (0.35%) |
| A6. Undergoing wisdom teeth extraction would el feelings of fear or anxiety about the surge (Negative) | ery. 668 (19.27%) | 1351 (38.96%) | 880 (25.40%) ar | 419 (12.08%) | 149 (4.29%) |
| A7. You place trust in your oral surgeon's treatment plan and are receptive to their professional adv (Positive) | ice. 1414 (40.80%) | 1724 (49.72%) | 216 (6.23%) | - 75 (2.17%) | 38 (1.10%) |
| A8. You consider the daily care or extraction of y wisdom teeth to be time-consuming and ener demanding, hence, you do not prioritize (Negative) | gy- 375 (0.38%) | 546 (15.75%) | 408 (11.76%) | ан Ад 19600 (46.14%) Се В. | 588 (17.00%) |

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| | | | | 087110 or | | |
| A9. You recognize the significance of a good diet and oral hygiene in preventing and managing wisdom teeth issues. (Positive)A10. You acknowledge the importance of regular | 1382 (39.87%) | 1550 (44.69%) | 215 (0.050() | ing for uses | 68 (1.96%) | |
| oral check-ups in preventing wisdom teeth-related diseases. (Positive) | 1407 (40.57%) | 1727 (49.77%) | 201 (5.79%) | or D22 (3.52%) December Enseignember Enseignement USES related to | 70 (2.02%) | |
| | Yes | No | | l to | | |
| A11. If the doctor recommends prophylactic wisdom teeth extraction, you would be willing to undergo the surgery. | 2784 (80.30%) | 683 (19.70%) | | ownload Superieu | | |
| A12. You prefer medication over surgery as an intervention for wisdom teeth, viewing surgery as a last resort rather than a first-choice approach. | 1650 (47.60%) | 1817 (52.40%) | | ed from http ur (ABES) . data mining. | | |
| A13. The reimbursement rates of medical insurance for wisdom teeth extraction and related costs significantly influence your decision on whether to undergo the procedure. | 1403 (46.47%) | 2064 (59.53%) | | Downloaded from http://bmjopen.b nt Superieur (ABES) . o text and data mining. Al training. | | |
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Moreover, 83.89% of patients indicated that they are highly capable of evaluating the risks and benefits associated with wisdom teeth extraction, and they readily accept their dentist's treatment recommendations (P9). Additionally, 79.23% reported using dental floss to clean the crevices that a toothbrush cannot effectively reach during oral cleaning (P5). Moreover, 74.70% of patients asserted their ability to evaluate issues and make incremental adjustments concerning their experiences with wisdom teeth prevention or treatment (P11). However, the proportion of patients who confirmed their intention to inform their family or friends about the potential hazards of wisdom teeth and remind them to seek prompt medical attention or have their wisdom teeth extracted was only 33.89% (P8). Similarly, only 47.76% of the patients reported being consciously vigilant about their oral health by regularly attending the dental clinic (P3) (**Table 3**).

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| Table 3. Practices | Very conforming N(%) | Conforming N(%) | Neutral N(%) | ng si | Very non-confor N(%) |
| P1: You will attend lectures on the topic of wisdom teeth and other oral health problems that can arise throughout your life, or you can acquire knowledge about the risks and wisdom teeth extraction through books and online resources. | 931 (26.88%) | 1100 (31.79%) | | mber 2024(%) inseignentent Superie 417fo text and | 216 (6.23%) |
| P2: If you are prescribed medication, it is essential to thoroughly read the instructions to comprehend its proper usage and potential adverse effects. | 858 (24.77%) | 1044 (30.16%) | 631 (18.23%) | G39mining 639mining | 295 (8.53%) |
| P3: Regularly, you conscientiously monitor your oral health by visiting the dental clinic.P4: When brushing your teeth, use a soft | 751 (21.70%) | 905 (26.14%) | 1041 (30.06%) | g, Attaining | 203 (5.87%) |
| toothbrush and pay careful attention to cleaning the back row of wisdom teeth, neighboring teeth, and gums. P5: To address areas that a toothbrush | 1140 (32.92%) | 1388 (40.08%) | 677 (19.55%) | g, and 4.45%) | 108 (3.12%) |
| cannot effectively reach during oral cleaning, utilize dental floss to clean the crevices. | 1379 (39.83%) | 1368 (39.49%) | 345 (9.96%) | 256177.40%) tech7.40%) | 119 (3.44%) |
| P6: As part of your routine, you regularly rinse your mouth with mouthwash to maintain good oral hygiene. P7: Regarding your diet, you are conscious | 1141 (32.95%) | 1446 (41.77%) | 384 (11.08%) | <u>بة</u> 308 (8.90%) | 188 (5.44%) |
| of reducing the consumption of sugary or spicy foods, and you promptly clean food | 944 (27.32%) | 1277 (36.90%) | 822 (23.75%) | Agence%) 278 (8. Bibliographique s.xhtml de | 146 (4.23%) |
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| 5 | debris through methods like brushing and flossing. | | | | n 31 D ing for | |
| 7 8 | P8: You will inform your family or friends | | | | ecemb Ense uses | |
| 9 10 11 | about the hazards of wisdom teeth and remind them to seek medical attention or | 1062 (30.70%) | 113 (3.27%) | 895 (25.87%) | 31 December 2024 Ing for uses related 274ted | 123 (3.56%) |
| 12 13 | promptly have their wisdom teeth removed if necessary. | | | | | |
| 14 15 | P9: You are capable of evaluating the risks and benefits associated with wisdom teeth | 1551 (44.79%) | 1354 (39.10%) | 396 (11.45%) | to text and dec 119dd | 47 (1.36%) |
| 16 17 | extraction and accepting your doctor's treatment recommendations. | | · · · · | | ed fron ur (ABI data m | |
| 18 19 20 | P10: You remain vigilant for symptoms such as swollen gums, teeth pain, and a foul | 880 (25.43%) | 1117 (32.28%) | 785 (22.69%) | 525aa 15a 17%) | 160 (4.63%) |
| 20 21 22 | taste in the mouth. P11: You have the ability to evaluate issues | | | | Al training 167 g ,4. | |
| 23 24 | and make adjustments gradually based on your experiences with wisdom teeth | 1094 (31.61%) | 1496 (43.24%) | 633 (18.29%) | | 77 (2.23%) |
| 25 26 | prevention or treatment. | | | W O | and sim | |
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The correlation analysis showed that the knowledge score and the attitude score were positively correlated (r = 0.288, p<0.001), and the knowledge score and the practice score were also positively correlated (r = 0.348, p<0.001). Additionally, there was a positive correlation between attitude and practice scores (r = 0.452, p<0.001) (**Table 4**).

| | Knowledge | Attitudes | Practices |
|-----------|-----------------|-----------------|-----------|
| Knowledge | G | | |
| Attitudes | 0.288 (P<0.001) | 1 | |
| Practices | 0.348 (P<0.001) | 0.452 (P<0.001) | 1 |

Table 4. Correlation analysis

The SEM was established to further investigate whether patients with impacted wisdom teeth knowledge and attitude toward wisdom teeth extraction affect their practice, whether attitude plays an intermediary role between knowledge and practice, and whether knowledge can directly affect their practice according to the KAP theory. It also investigated the effect of other factors including residence and monthly per capita household income on the three dimensions mentioned above (**Table S2**). The fitting index of the structural model (CMIN/DF = 13.905; RMSEA = 0.061; IFI = 0.847; TLI = 0.834; CFI = 0.847) outperformed the respective threshold value, signifying that the data fit the structural model satisfactorily (**Table S3**). The SEM demonstrated that knowledge had direct effects on attitudes, as indicated by a path coefficient of 2.042 (p<0.001) and a significant and attitudes had direct effects on practices, with a path coefficient of 1.460 (p<0.001) (**Figure 1**).

Discussion

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Patients with impacted wisdom teeth had sufficient knowledge, favorable attitudes, and proactive practices toward wisdom teeth extraction.

However, this study still identified deficiencies of certain aspects. Additionally, variances in KAP levels were observed across different demographic characteristics within the patients. These findings underscore the importance of considering these factors in the development of subsequent health education programs. The present study found that male and younger patients (<30 years) tend to have higher KAP scores. This finding is different from previous studies which reported higher oral health knowledge and behaviors among female and partipants older than 30 years^{17, 18}. Nonetheless, the previous studies were not conducted in a Chinese population, and characteristics of their participants were distinctive different from participants in our study. Further education and tailored interventions should be designed for female and older patients in China. Furthermore, the present study identified that urban residents, those with higher education levels, non-smokers, non-drinkers, those who had not undergone dental treatment other than wisdom teeth removal, and those who were not informed and education about wisdom teeth during their dental treatment had lower KAP scores, and future programs should also consider the knowledge needs of these patients to enhance the dental care quality and the KAP towards wisdom teeth.

The present study found sufficient knowledge of wisdom teeth and that most patients would accept being educated about wisdom teeth during other oral therapies. patients had good knowledge about potential complications associated with wisdom teeth and the importance of treating wisdom teeth in a timely manner. This finding is consistent with previous knowledge and awareness studies conducted on medical students: a large percentage of the study population was aware of wisdom teeth impaction and its consequences^{19, 20}. Patients in the present study had less knowledge about infection

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related to wisdom teeth and different treatment options. Hanna et al. have found that patients used the internet to seek information related to wisdom teeth, but internet use was not associated with better wisdom teeth knowledge²¹. Therefore, it is important for healthcare professionals to provide patients with accurate information and internet guidance to improve wisdom teeth knowledge. Zincir et al. reported that patients found educational videos related to wisdom teeth surgical removal were excellent for patient education, and educational videos in Chinese should be made available to improve patients' knowledge²². Increased awareness of hazards and removal of wisdom teeth among patients with impacted wisdom teeth will help in the management of wisdom teeth²³.

In the present study, most patients had a positive attitude toward seeking professional advice and medical treatments, and they also trusted the treatment plan formulated by their oral surgeon. This result reflected a high level of patient trust in dentists, and the level of trust is higher than previously reported^{24, 25}. This discrepancy can be explained by the larger proportion of patients with higher education in the present study²⁶. Similar to previous findings, patients in the present study reported a high level of anxiety about the potential hazards of wisdom teeth and extraction surgery²⁷⁻²⁹. Lack of knowledge about the procedure is one of the possible contributors to anxiety related to oral surgery²⁹. Effective education toward wisdom teeth extraction is critical in reducing anxiety in patients and improving the quality of care. Moreover, in the present study, medical insurance reimbursement rates were a decisive factor for wisdom teeth extraction, which is consistent with a previous study conducted in the United States³⁰. Thus, there is a need to improve insurance coverage of wisdom teeth treatments to improve adherence to dentists' recommendations.

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Most patients claimed that they would weigh the risks and benefits of wisdom teeth extraction to make an informed decision, and around 80% would use dental floss regularly. Zhao et al. reported that very few Chinese adults use dental floss, and the patients with impacted wisdom teeth in the present study might have better practice than the general population due to their disease experience and better dental knowledge³¹. Liu et al. reported that the rate of dental care visits and the utilization of oral health resources are low in the Chinese general population³². It is important to enhance patients' practice by improving their knowledge and attitude toward wisdom teeth extraction. Furthermore, this study found that patients who had prior wisdom teeth extraction demonstrated better knowledge, attitudes and practices compared to those without previous wisdom teeth extraction experience. Similarly, Brasileiro et al. also identified that patients with a history of teeth extraction²⁹. Patients who had no experience with wisdom teeth extraction may need more attention to improve their KAP in this area.

The results of correlation analysis and SEM demonstrated that patients with impacted wisdom teeth knowledge had direct effects on attitudes, and attitudes had direct effects on practices. These implies that patients with impacted wisdom teeth with better knowledge about wisdom teeth would have more favorable attitudes, which indirectly results in better practice toward wisdom teeth³³. The finding highlighted the importance of education in patients with impacted wisdom teeth to improve their knowledge, as well as their attitude and practice toward wisdom teeth. It also found that residence had direct effects on knowledge and monthly per capita household income had direct effects on attitudes. This finding is consistent with previous studies on dental health and dental care utilization in China^{32, 34, 35}. Patients with lower income and those who lived in rural

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> areas tend to have poorer knowledge and health-seeking behaviors, and more clinical and research attention should be paid to these patients. In addition to common complications, patients should also be informed about rare but serious risks associated with wisdom teeth extraction, such as nerve damage. Damage to the inferior alveolar nerve (IAN) or the lingual nerve, which can occur during extraction of deeply impacted lower wisdom teeth, can result in long-term sensory changes, including numbness, tingling, or even pain in the lower lip, chin, or tongue. Although such nerve injuries are uncommon, with incidence rates reported between 0.4% and 8.4% depending on the complexity of the extraction, the potential impact on a patient's quality of life makes it essential for healthcare providers to discuss these risks. Providing patients with clear information about these rare but serious complications can support informed decisionmaking and reduce postoperative anxiety.

> This study has some limitations. The self-reported nature of the data collection may result in deviations between reported and actual practices. Additionally, since over half of the sample has undergone wisdom tooth removal, there might be inherent differences in knowledge and attitudes compared to those who have not experienced the procedure. Future research could consider handling these two groups separately or using a quasiexperimental design to better explore these differences. Moreover, while this study focuses on common outcomes, it may not fully capture rare complications associated with wisdom teeth extraction, such as changes in sensation due to nerve damage. The large sample size enhances representativeness and generalizability of the results. Furthermore, this study provides an in-depth exploration of the relationship between patients with impacted wisdom teeth knowledge, attitudes, and practices regarding wisdom teeth extraction. These findings offer valuable insights to inform clinical guidance in this area.

Conclusions

In conclusion, this KAP study demonstrated sufficient knowledge, favorable attitudes, and proactive practices toward wisdom teeth extraction among patients with impacted wisdom teeth. Further tailored interventions should be developed and implemented in this population to improve their KAP of wisdom teeth.

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Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of the School and Hospital of Stomatology, Cheeloo College of Medicine, Shandong University (Ethical No. 20230361), The medical ethics committee of Jinan Stomatological Hospital (JNSKQYY-2023-001) and Informed consent was obtained from all patients. I confirm that all methods were performed in accordance with the relevant guidelines. All procedures were performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

Patient and Public Involvement

Patients were not directly involved in the design, conduct, or reporting of this study. However, the study results are planned to be disseminated to participants and relevant patient communities, ensuring accessible formats and timings based on public interest.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analysed during this study are included in this published article.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

 conceived and designed the experiments: Jing Sun, Junru Meng, Shu Li, Dongdong Tong

 2) performed the experiments: Jing Sun, Xin Wang, Bing Wang, Xiao Luan, Dongdong Tong

3) analyzed and interpreted the data: Jing Sun, Junru Meng, Xin Wang, Shu Li,Dongdong Tong

4) contributed reagents, materials, analysis tools or data: Jing Sun, Junru Meng, Xin

Wang, Bing Wang, Xiao Luan, Shu Li, Dongdong Tong

5) wrote the paper: Jing Sun, Junru Meng, Shu Li, Dongdong Tong

6) Dongdong Tong is the guarantor

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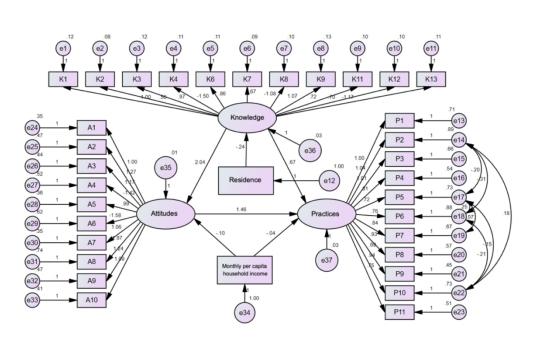
34. Li C, Yao N, Yin A. Disparities in dental healthcare utilization in China. *Community Dentistry and Oral Epidemiology* 2018;46:57685.doi:https://doi.org/10.1111/cdoe.12394

35. Li C, Yao NA. Socio–Economic Disparities in Dental Health and Dental Care Utilisation Among Older Chinese. *International Dental Journal* 2021;71:67-75.doi:https://doi.org/10.1111/idj.12600

R R R R

| 1 2 3 4 5 6 7 8 | Figure Legends Figure 1. The KAP structural equation model |
|--|---|
| 9 10 11 12 13 14 15 16 17 18 | |
| 19 20 21 22 23 24 25 26 27 28 | |
| 29 30 31 32 33 34 35 36 37 | |
| 38 39 40 41 42 43 44 45 46 47 | |
| 48 49 50 51 52 53 54 55 56 57 58 59 60 | |







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Supplemen

Table S1. Dem

| | | Knowledge | | Attitudes | 202. Jnem latec | Practices | |
|-------------------------|--------------|-----------------|---------|------------|--|------------------|---------|
| /ariables | N (%) | Mean ± SD | Р | Mean ± SD | er 2024. Dow ignement Su elated to te | Mean ± SD | Р |
| Total | 3467 | 9.14±1.35 | | 38.01±2.72 | wnloa Huperi Aur (بل hyt an Handdat | 41.65±8.24 | |
| Gender | | | < 0.001 | | | | < 0.001 |
| Aale | 1208 (34.84) | 9.47±1.02 | | 39.02±1.97 | from (ABE: ta mii | 48.55±5.59 | |
| Female | 2259 (65.16) | 8.97±1.47 | | 37.47±2.91 | http:/ S) . ning, . | 37.97±6.96 | |
| Age, years | | | < 0.001 | | ⊲⊒.0 | | < 0.001 |
| 0 and below | 1092 (31.50) | 9.57±1.03 | | 39.32±2.12 | open. ining | 48.89±5.41 | |
| 51-40 | 889 (25.64) | 9.39±1.19 | | 38.31±2.55 | , and | 42.46±7.30 | |
| -1-50 | 1051 (30.31) | 8.81±1.53 | | 37.02±2.77 | from http://破 jopen.bmj.com/ on June马0, 2025 (ABES). ta mining, Altyaining, and similar techtologies | 36.62±6.06 | |
| 1 and above | 435 (12.55) | 8.37±1.36 | | 36.50±2.60 | n Jur ır tecl | 34.01±4.13 | |
| Residence | | | < 0.001 | | | | < 0.001 |
| Rural | 540 (15.58) | 9.43±1.01 | | 39.11±1.74 |), 2025 ogies. | 50.34±4.43 | |
| Jrban | 2927 (84.42) | 9.09 ± 1.40 | | 37.80±2.82 | . 5 at | 40.05 ± 7.76 | |
| Education | | | < 0.001 | | | | < 0.001 |
| Aiddle school and below | 131 (3.78) | 9.21±1.05 | | 38.99±1.57 | nce Bibliographique de s.xhtml de | 51.73±2.87 | |

| | | | | BMJ Open | | ijopen-2(1 by cop | | Page 36 of 50 |
|--|--|---------------|----------------------|----------------|-------------------------|--|------------|---------------|
| 1 2 3 | | | | | |)24-087110 /right, inclu | | |
| 4 5 6 7 | High school/Technical secondary school | 354 (10.21) | 9.44±0.93 | | 39.17±1.77 | on 31 Dec uding for u | 50.35±4.61 | |
| 9 10 | Junior college/Undergraduate | 2382 (68.70) | 9.24±1.33 | | 38.02±2.73 | ember 2 Enseigr Ises rela | 41.46±7.76 | |
| 10 11 12 | Postgraduate and above | 600 (17.31) | 8.56±1.51 | < 0.001 | 37.06±2.97 | 2024. E nemera nted to | 35.08±5.34 | <0.001 |
| 13 14 15 16 | Occupation State Organ and Enterprise Leaders | 239 (6.89) | 9.40±0.99 | <0.001 | 39.21 ±1.81 | Sownloader Superieur √ext and d | 51.03±4.51 | <0.001 |
| 17 18 19 | Professional and Technical Personnel (e.g., teachers, doctors, engineers, writers, | 976 (28.15) | 9.54±1.03 | | 39.04±2.05 | d from http (ABES) . ata mining, | 47.84±5.90 | |
| 20 21 22 23 24 | etc.) General Employees and Support Staff | 473 (13.64) | 9.40±1.15 | | 38.41±2.50 | ://bmjopen.t | 42.44±7.03 | |
| 24 25 26 27 28 | Commercial and Service Industry Workers | 345 (9.95) | 9.19±1.43 | | 37.72±2.75 | mj.com/ on and similar | 39.81±7.22 | |
| 29 30 31 32 33 34 | Agriculture,Forestry,AnimalHusbandry,Fisheries,andWaterResources WorkersVariant | 199 (5.74) | 8.89±1.45 | | 37.64±2.58 | jopen-2024-087110 on 31 December 2024. | 37.77±6.75 | |
| 35 36 37 38 39 40 41 42 | | | | | | Agence Bibliographique de | | |
| 43 44 45 46 | | For peer revi | iew only - http://bn | njopen.bmj.con | n/site/about/guidelines | s.xhtml e | | |

| Page 37 of 50 | | | | BMJ Open | | ijopen- 1 by co | | |
|--|--|--|-------------------------------------|----------------|--|--|--|---------|
| 1 2 3 4 5 6 7 8 | Production and Transport Equipment Operators | 174 (5.02) | 8.81±1.49 | | 36.82±2.83 | jopen-2024-087110 on 31 December 3 Enseigr I by copyright, including for uses rela | 36.56±94 | |
| 8 9 10 11 12 13 14 | Military Student Others | 48 (1.38) 748 (21.57) 265 (7.64) | 8.90±1.74 8.71±1.48 8.61±1.62 | | 37.67±2.91 36.85±3.00 37.15±3.02 | nber 2024. Download seignement Superie s related to text and | 37.29±6.83 35.66±5.34 35.40±6.45 | |
| 15 16 | Medical Insurance | | | | | oadec erieur and da | | |
| 17 | No medical insurance | 306 (8.83) | | | | ata m | | |
| 18 19 20 21 | Social medical insurance Social and commercial medical insurance | 1283 (37.01) 1878 (54.17) | | | | m http://bn ES) : nining, Al t | | |
| 22 23 | Monthly per capita household income (CNY) | | | < 0.001 | | raie ⊲⊉.0® | | < 0.001 |
| 24 25 | <2,000 | 218 (6.29) | 9.33±0.95 | | 39.30±1.78 | n.bmj ıg, an | 51.41±3.98 | |
| 26 27 | 2,000-5,000 | 682 (19.67) | 9.58±1.01 | | 39.14±1.84 | //bmjo耍n.bmj.com/ on June 10, 20褒 Al traiqing, and similar technologie实 | 49.18±5.10 | |
| 28 29 | 5,000-10,000 | 1263 (36.43) | 9.35±1.25 | | 38.13±2.71 | on Ju Iar tec | 41.99±7.28 | |
| 30 31 | 10,000-20,000 | 831 (23.97) | 8.78±1.50 | | 37.28±2.86 | ine 10 chnol | 36.34±5.96 | |
| 32 | >20,000 Smoking | 473 (13.64) | 8.51±1.54 | < 0.001 | 36.74±2.96 |), 20⊉ ogie s | 34.75±5.03 | < 0.001 |
| 33 34 | Yes | 503 (14.51) | 9.40±0.99 | <0.001 | 39.18±1.60 | | 50.80±3.47 | <0.001 |
| 35 36 | No | 2964 (85.49) | 9.10±1.40 | | 37.81±2.82 | Ageno | 40.10±7.79 | |
| 37 38 | Alcohol consumption Yes | 656 (18.92) | 9.44±1.00 | < 0.001 | 39.26±1.78 | <0.0 6 1 Bi | 50.25±4.43 | < 0.001 |
| 39 40 41 42 43 44 45 46 | 103 | | | njopen.bmj.con | n/site/about/guideline | at Agen@I <0.0@Bibliographique de I | JU.25 ±1.13 | |

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|---|--------------|----------------------|--|---|---------------|
| | | | | jopen-2024-087110 on 31 De d by copyright, including for | |
| No | 2811 (81.08) | 9.07±1.41 | 37.72±2.82 | lin n 31 39.65±7.60 | |
| Frequency of teeth brushing (per day) | | | < 0.001 | orusosi Enise √si | <0.001 |
| 1 time | 550 (15.86) | 9.47±0.99 | 39.19±1.78 | relate 50.02 ±4.79 | |
| 2 times | 2391 (68.96) | 9.22±1.36 | 38.03±2.72 | 41.32±7.78 | |
| 3 times | 469 (13.53) | 8.48 ± 1.45 | 36.71±3.00 | te Supple 34.54±4.76 | |
| 4 times or more | 57 (1.64) | 8.35±1.38 | 36.46±2.47 | and during 33.33 ±3.39 | |
| OralDiseaseComplications(multiplechoices) | | | review on | 39.65 \pm 7.60 31 December 2024. 50.02 \pm 4.79 41.32 \pm 7.78 34.54 \pm 4.76 33.33 \pm 3.39 / ing, Al training, and similar technologies. | / |
| Gum Disease | 986 (28.44) | | | 10mjop Al train | |
| Dental Caries | 1536 (44.30) | | | en.bi | |
| Pulpitis | 689 (19.87) | | | mj.co and s | |
| Oral Cancer | 450 (12.98) | | | m/ or imila | |
| Oral ulcers | 700 (20.19) | | | n Jun r tect | |
| Dentition defects | 348 (10.04) | | | e 10, 20 mologi | |
| Irregular teeth alignment | 1082 (31.21) | | | | |
| Loose teeth | 279 (8.05) | | | at Agence | |
| Other oral diseases | 276 (7.96) | | | | |
| | | | | Bibliographique de | |
| | For peer rev | iew only - http://bm | njopen.bmj.com/site/about/guidelines.xht | tml e | |

| Page 39 of 50 | | | | BMJ Open | | ijopen-2024-08; d by copyright, | | |
|---------------------------------|---|----------------------------|------------------------|----------------|--------------------------|--|--------------------------|---------|
| 1 2 3 4 5 6 7 | No oral conditions as described above Undergone wisdom teeth | 215 (6.20) | | | | jopen-2024-087110 on 31 Dece E 1 by copyright, including for us | | |
| 8 9 | extraction | | | < 0.001 | | < B.B.B.B. Feiger | | < 0.001 |
| 10 11 | Yes | 1790 (51.63) | 9.51±1.08 | | 38.90±2.33 | 2024. gneme lated t | 46.45±6.87 | |
| 12 13 | No | 1677 (48.37) | 8.75 ± 1.49 | | 37.05±2.78 | nt Sup to text | 36.53±6.25 | |
| 14 15 16 | If have, the age at that time (years old) | | | <0.001 | | nloaæd f perieur (∕ an¢data | | < 0.001 |
| 17 18 | 20 and below | 350 (10.10) | 9.29±0.99 | | 39.39±1.91 | ABES a mini | 51.24±3.55 | |
| 19 20 21 | 21-30 30 and above | 855 (24.66) 585 (16.87) | 9.55±1.03 9.57±1.19 | | 39.19±2.18 38.19±2.61 | ing, | 47.72±6.08 41.73±6.68 | |
| 22 | If have, the reasons were | × , | | | | raini | | / |
| 23 24 25 26 | (multiple choices): Recurring painful inflammation | 1091 (31.47) | | 1 | | http://bmjopen.bmj.com/ on June 10, 2025 S) . ning, Al training, and similar technologies. | | 7 |
| 27 28 | Get stuck between the teeth or cheek grinding | 903 (26.05) | | | | n/ on J milar t | | |
| 29 30 31 | Dental caries or periodontal disease | 774 (22.32) | | | | - 10, | | |
| 32 33 34 | Prophylactic extractions or findings on check-ups | 912 (26.31) | | | | •. | | |
| 35 36 37 | Surgical requirements | 388 (11.19) | | | | at Agence Bibliographique de s.xhtml | | |
| 38 39 40 | | | | | | ibliogra | | |
| 41 42 | | | | | | ıphique | | |
| 43 44 45 | | For peer rev | view only - http://br | njopen.bmj.cor | n/site/about/guideline | s.xhtml | | |

| | | | BMJ Open | | ijopen-20 1 by copy | | | Page 40 of 50 |
|--|--------------|---------------------|----------------|------------------------|--|------------|--------|---------------|
| Other Undergone oral therapy other than treatment for wisdom teeth related oral diseases | 113 (3.26) | | <0.001 | | jopen-2024-087110 on 31 Dece语ber 2024. Downloaded fro语 E森eignement Superieur (ABE 1 by copyright, including for usጭ related to text and data ң | | <0.001 | |
| Yes | 1780 (51.34) | 9.50±1.07 | | 38.89±2.34 | :4. Dov nent S d to te | 46.55±6.80 | | |
| No | 1687 (48.66) | 8.76±1.50 | | 37.08±2.78 | wnloa Superio ext and | 36.49±6.22 | | |
| Acceptance of being informed and educated about wisdom teeth during other oral therapies | | | <0.001 | | (http: s) · ning, | | <0.001 | |
| Yes | 2540 (73.26) | 9.33±1.24 | | 38.41±2.58 | //bmjopen. Al training | 43.97±7.86 | | |
| No | 927 (26.74) | 8.63±1.49 | | 36.89±2.79 | <u> </u> | 35.30±5.41 | | |
| | | | | | mj.com/ on June 10, 2025 at Agence Bibliographique de and similar technologies. s.xhtml | | | |
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|-------------------|---------------------------|----------------------|--|--|------|
| Table S2. Test re | esults of the hypothesis. | | | jopen-2024-087110 on 31 D J by copyright, including fo | |
| | Hypothesized paths | | | path coefficient | P va |
| Hypothesis 1 | Knowledge | < | Residence | ; relation | <0.0 |
| Hypothesis 2 | Attitudes | < | Knowledge |)24.20)mest edrto | <0.0 |
| Hypothesis 3 | Attitudes | / < | Monthly per capita househol income | d | <0.0 |
| Hypothesis 4 | Practices | < | Attitudes | a min | <0.0 |
| Hypothesis 5 | Practices | < | Knowledge | ing:600 | 0.1 |
| Hypothesis 6 | Practices | < | Monthly per capita househol | n∰Al train048, a | 0.0 |
| | | | | j.com/ on June 10, 2025 at Agence Bibliographique de nd similar technologies. | |
| | For p | beer review only - h | ttp://bmjopen.bmj.com/site/about/guideline | s.xhtml | |

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| | | , inclu | |
| Table S3. Model fitness indices for the | e KAP structural equation model | on 31 E Iding fo | |
| Goodness-of-Fit Indices | Ideal standards | ធ្មី <u>អ្</u> ពីន្ទុasurement value | |
| CMIN/DF | 1-3 excellent, 3-5 good | المعالية المعالية المع معالية المعالية المعالية معالية المعالية المعال معالية المعالية معالية معالية معالية معالية معالية المعالية المعالية المعالية معالية معالي | |
| RMSEA | <0.08 good | te enge de de 1 to n enge | |
| IFT | >0.8 good | | |
| TLI | >0.8 good | and da | |
| CFI | >0.8 good ree of freedom; RMSEA, root mean square error of a | ata di ABBEN mi | |
| | | /bmjopen.bmj.com/ on June 10, 2025 at Agence Bibliographique de Al training, and similar technologies. | |
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|-----------------------|---|
| Questionnaire | BMJ Open BMJ |
| | Part I Demographic information |
| 1. Gender | a. Male |
| | b. Female |
| 2. Age, years | |
| 3. Residence | a. Rural |
| | b. Urban |
| 4. Education | a. Middle school and below |
| | b. High school/Technical seco |
| | c. Junior college/Undergraduæ |
| | d. Postgraduate and above |
| 5. Occupation | a.State Organ and Enterprise Bacers |
| | b.Professional and Technicag Personnel (e.g., teachers, doctor |
| | engineers, writers, etc.) |
| | c.General Employees and Support Staff |
| | d.Commercial and Service Indestry Workers |
| | e.Agriculture, Forestry, Aningal Husbandry, Fisheries, and Wate |
| | Resources Workers |
| | f.Production and Transport Economic Production |
| | g.Military |
| | h.Student 🏨 |
| | I.Others |
| 6. Medical Insurance: | a. No medical insurance |
| | b. Social medical insurance |

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| | t, inclu |
| | c. Social and commercial medecal generations contracted and commercial medecal generations and commercial medical generations and commercial medecal generations and commercial medical generations and commercial medecal generations and commercial medecal generations and commercial medecal generations and commercial medical generat |
| 7. Monthly per capita household income (CNY) | |
| | a. <2,000 9 D b. 2,000-5,000 5 0000 5 0000 |
| | c. 5,000-10,000 |
| | d. 10,000-20,000 |
| | e. >20,000 |
| 8. Smoking | a. Yes ố vậ |
| | b. No are o |
| 9. Alcohol consumption | a. Yes |
| | b. No ta Afr |
| 10. Frequency of teeth brushing (per day) | a. 1 time |
| | b. 2 times |
| | c. 3 times d. 4 times or more |
| | b. 2 times c. 3 times d. 4 times or more |
| 11. Oral Disease Complications | |
| | b. Dental Caries |
| | a. Gum Disease b. Dental Caries c. Pulpitis d. Oral Cancer e. Oral ulcers f. Dentition defects g. Irregular teeth alignment h. Loose teeth |
| | d. Oral Cancer |
| | e. Oral ulcers |
| | f. Dentition defects |
| | g. Irregular teeth alignment |
| | g. Irregular teeth alignment 0 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 |
| | i. Other oral diseases |
| | j. No oral conditions as described bove |
| 12. Undergone wisdom teeth extraction | a. Yes |
| | b://bmjopen.bmj.com/site/about/guidelines.xhtml d |
| For neer review only - http | p://bmjopen.bmj.com/site/about/guidelines.xhtml q |
| To peer review only - http | |

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| Page 45 of 50 | BMJ O | ppen copy 20 |
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| 5 | | b. No <u>G</u> ¥ |
| 6 | 12.1 If have, the age at that time (years old) | for De |
| 7 8 | 12.2 If have, the reasons were: | a. Recurring painful inflamma |
| 9 | | b. Get stuck between the teeth a grinding |
| 10 | | c. Dental caries or periodontal |
| 11 | | d. Prophylactic extractions or $\mathbf{\hat{b}}_{\mathbf{a}}$ |
| 12 13 | | e. Surgical requirements $\vec{b} \vec{c} \vec{e} \vec{s}$ |
| 14 | | e. Surgical requirements f. Other a. Yes defined a. Yes |
| 15 | 13. Undergone oral therapy other than treatment for wisdom teeth related | a. Yes |
| 16 17 | oral diseases | a. Yes da fe b. No a Afr |
| 18 | 14. Acceptance of being informed and educated about wisdom teeth | a. Yes |
| 19 20 | during other oral therapies | a. Yes nig. |
| 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 | | Nomjopen.bmj.com/ on June 10, 2025 at Agence Bibliographique de Al training, and similar technologies. |
| 42 43 44 45 46 | For peer review only - http://bmjopen.k | omj.com/site/about/guidelines.xhtml |

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|---|--|---------------|-----|
| | 2024 vpyri | | |
| | 1-087 ght, | | |
| | 7110 incl | | |
| |) on udir | | |
| Part II Knowledge K1 Wisdom teath also known as third molars, are the last and farthest back teath to | 31 E Ng fc | | |
| K1. Wisdom teeth, also known as third molars, are the last and farthest-back teeth to emerge in the mouth. They typically surface in adults between the ages of 18 and 25 |) vr us | | |
| years. | A Yes T e | B.No | |
| K2. The primary issues associated with wisdom teeth are insufficient space and | <u> </u> | D .110 | - |
| misalignment. | A.Yes to | B.No | |
| K3. The emergence of wisdom teeth can lead to pain, inflammation, facial and jaw | e so | | - |
| congestion, edema, and difficulty in swallowing. | A.Yes and the second se | B.No | |
| K4. In cases where the growth of wisdom teeth leads to a severe infection, fever may | d dec | | - |
| not necessarily be present. | A.Yes a A fro | B.No | _ |
| K5. Wisdom teeth are unlikely to cause damage to neighboring teeth, even if left | | | - |
| untreated promptly. | A.Yese | B.No | _ |
| K6. The growth of wisdom teeth can create gaps that allow food debris to enter, | Al train A.Yesin | | |
| resulting in a range of symptoms, including inflammation. | A.Yes | B.No | _ |
| K7. Consuming spicy, hard, and sticky foods can exert pressure on the teeth, leading | ing, and similar A.Yesilar | | |
| to pain and swelling. Additionally, sugars in food and drinks can contribute to plaque | and and | | |
| buildup on teeth, causing dental caries and other oral problems. Thus, it is advisable | A.Yes | | |
| to minimize their intake. | A.Yes a | B.No | _ |
| K8. Not all patients require wisdom teeth extraction, particularly if they are growing | A.Yessol | | |
| normally and not causing any dental problems. | A.Yes 0 1 | B.No | _ |
| K9. Various treatment options exist for wisdom teeth, including medications | 9, 2025 logies. | | |
| (antibiotics, traditional Chinese medicine, etc.) and surgical procedures (incision and | ۵ ۵ | | |
| drainage, wisdom teeth extraction, etc.). | A.Yes | B.No | _ |
| K10. Delaying the treatment of wisdom teeth may result in harm to neighboring teeth. | ence | | |
| K10. Delaying the treatment of wisdom teen may result in name to negationing teen. | A.Yes | B.No | |
| | blio | | _ |
| | A.Yes B. bliographique /guidelines.xhtml de | | |
| | hiq | | |
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| Page 47 of 50 BMJ Open | d by cop | iopen-2 |
|---|--|--|
| 1 2 3 4 5 K11. Wisdom teeth extraction may cause temporary discomfort and swelling, but it generally does not have any long-term effects on the function and appearance of the | uding | iopen-2024-087110 on 31 De |
| 7 mouth. | A.Yes | B.No |
| 9 K12. Following the wisdom teeth extraction, patients should adhere to the prescribed | s rela | b P |
| ¹⁰ regimen, which may include ice compresses, a specific diet, and proper oral care, to | ated | |
| 12 aneviate pant. | A.Yes | B.No |
| 13 14 15 K13. Wisdom teeth extraction always leads to a slimmer face. | A.Yes | B.No |
| 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 For peer review only - http://bmjopen.bmj.com/site/about/gu | ur (ABES) . data mining, Al training, and similar technologies. | led from http://bmiopen.bmi.com/ on June 10. 2025 at Agence Bibliographique de l |

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|--|---------------------|---------|---|------------|------------------------|
| | | | 7110 on 31 including | | |
| Part II | I Attitudes | | for L | | |
| A1. You are willing to proactively discuss your condition with your doctor and seek professional medical support. | a.Strongly agree | b.Agree | c. Nos reign reign | d.Disagree | e.Strongly Disagree |
| A2. You are open to discussing your wisdom teeth condition with friends or family and seeking their advice on whether to retain or extract them. | a.Strongly agree | b.Agree | 0224. Dowr ement Sup table to text | d.Disagree | e.Strongly Disagree |
| A3. You are willing to acquire medical knowledge related to the risks and wisdom teeth extraction through concise online videos or books. | a.Strongly agree | b.Agree | nload betteur (ABE N data min c. min | d.Disagree | e.Strongly Disagree |
| A4. You are concerned about potential hazards posed by wisdom teeth in your daily life, such as inflammation and infection. | a.Strongly agree | b.Agree | c. Neget p | d.Disagree | e.Strongly Disagree |
| A5. You firmly believe in seeking medical treatment if you experience visible symptoms related to your wisdom teeth. | a.Strongly agree | b.Agree | c. Negutral ini pe | d.Disagree | e.Strongly Disagree |
| A6. Undergoing wisdom teeth extraction would elicit feelings of fear or anxiety about the surgery. | a.Strongly agree | b.Agree | c. Neutrenj.co | d.Disagree | e.Strongly Disagree |
| A7. You place trust in your oral surgeon's treatment plan and are receptive to their professional advice. | a.Strongly agree | b.Agree | c. Notilar t | d.Disagree | e.Strongly Disagree |
| A8. You consider the daily care or extraction of your wisdom teeth to be time-consuming and energy-demanding, hence, you do not prioritize it. | a.Strongly agree | b.Agree | ليليا و 10, 20 د. Nhnologie | d.Disagree | e.Strongly Disagree |
| A9. You recognize the significance of a good diet and oral hygiene in preventing and managing wisdom teeth issues. | a.Strongly agree | b.Agree | c. Neutral | d.Disagree | e.Strongly Disagree |
| A10. You acknowledge the importance of regular oral check-ups in preventing wisdom teeth-related diseases. | a.Strongly agree | b.Agree | c. Neutral | d.Disagree | e.Strongly Disagree |
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| 1 2 3 4 | BMJ Open BMJ Open A11. If the doctor recommends prophylactic wisdom teeth a.Yes b.No b.No |
| 5 6 | extraction you would be willing to undergo the surgery \vec{o} |
| 7 | A12. You prefer medication over surgery as an intervention for wisdom teeth, viewing surgery as a last resort rather than a first- choice approach. |
| 8 9 | wisdom teeth, viewing surgery as a last resort rather than a first- |
| 10 | A12. You prefer medication over surgery as an intervention for a.Yes b.No wisdom teeth, viewing surgery as a last resort rather than a first-choice approach. |
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| | Part IV Practice | |
| P1: You will attend lecture | s on the topic of wisdom teeth and other oral health problems that can arise the grade hout your life, or you can acquire | _ |
| knowledge about the risks | and wisdom teeth extraction through books and online resources. | |
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| b. Conforming | ad the rest of the | |
| c. Neutral | | |
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| e Very non-conforming | | |
| P2: If you are prescribed n | nedication, it is essential to thoroughly read the instructions to comprehend $\frac{1}{3}$ and $\frac{1}{3}$ and potential adverse | _ |
| effects. | | |
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| | ntiously monitor your oral health by visiting the dental clinic. | |
| a. Very conforming | ntiously monitor your oral health by visiting the dental clinic. | |
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| d. Non-conforming | | |
| e. Very non-conforming · | <u>s N</u> | |
| P4: When brushing your te | eth, use a soft toothbrush and pay careful attention to cleaning the back row of windom teeth, neighboring teeth, and | |
| gums. | Ager | |
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| | c. Neutral |
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| | P5: To address areas that a toothbrush cannot effectively reach during oral cleaning, utilize dental floss to the crevices. |
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| | c. Neutral |
| | d. Non-conforming |
| | e. Very non-conforming |
| | P6: As part of your routine, you regularly rinse your mouth with mouthwash to maintain good oral hygi |
| | a. Very conforming |
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| | c. Neutral |
| | d. Non-conforming |
| | e. Very non-conforming |
| | P7: Regarding your diet, you are conscious of reducing the consumption of sugary or spicy foods, and you promptly clean food debris through |
| | methods like brushing and flossing. |
| | a. Very conforming |
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| | b. Conforming c. Neutral d. Non-conforming e. Very non-conforming |
| | d. Non-conforming |
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| | P8: You will inform your family or friends about the hazards of wisdom teeth and remind them to seek medigal attention or promptly have their |
| | wisdom teeth removed if necessary. |
| | a. very conforming |
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| c. Neutral | ing 31 |
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| P9: You are capable of eval | luating the risks and benefits associated with wisdom teeth extraction and eccepting your doctor's treatmer |
| recommendations. | late 202 |
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| e. Very non-conforming | |
| P10: You remain vigilant for | symptoms such as swollen gums, teeth pain, and a foul taste in the mouth. |
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| e. Very non-conforming | |
| P11: You have the ability to | evaluate issues and make adjustments gradually based on your experies with wisdom teeth prevention of |
| treatment. | |
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