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Knowledge, attitude and practice toward liraglutide and semaglutide among endocrinology medical staff

Bingling Liu[1], Xueyi Wu[2], Xiao Zou[1], Jianjian Sheng[1] & Jie Yu[1]✉

Semaglutide and liraglutide are commonly used to address metabolic disorders, but differ in usage, clinical efficacy and safety profiles. Endocrinology medical staff are crucial in ensuring the appropriate administration, but their knowledge, attitude, and practice (KAP) towards these medications have been underexplored. The study aimed to investigate their KAP toward liraglutide and semaglutide. A cross-sectional study was performed from September to December 2023 at the First People's Hospital of Jiujiang. Endocrinology medical staff completed a self-administered questionnaire for KAP assessment regarding liraglutide and semaglutide. A total of 265 participants were enrolled (mean age: 36.31 ± 8.17 years old), including 134 (50.57%) males. The average scores were as follows: knowledge 11.77 ± 3.37 (range: 0–16), attitude 39.30 ± 4.61 (range: 10–50), and practice 27.70 ± 5.52 (range: 7–35). The structural equation model (SEM) showed that knowledge significantly influenced attitude (β = 0.976, *P* < 0.001) and practice (β = 1.289, *P* < 0.001). Additionally, attitude had a significant effect on practice (β = 0.627, *P* < 0.001). This study revealed deficiencies in the KAP scores among endocrinology medical staff, emphasizing the necessity for targeted strategies to improve professional proficiency with liraglutide and semaglutide.

Keywords Knowledge, attitude, and practice, Medical staff, Endocrine department, Liraglutide, Semaglutide, Cross-sectional study

As the prevalence of metabolic disorders, particularly type 2 diabetes and obesity, continues to rise globally, the demand for effective therapeutic interventions has grown significantly[1,2]. Among the available pharmacological options, glucagon-like peptide-1 receptor agonists (GLP-1RA) have become the key players, exerting their effects by potentiating insulin secretion and reducing food intake[3]. The two most common agents, semaglutide and liraglutide, have been proven highly effective in improving blood glucose and promoting weight loss in patients with metabolic disorders[4,5]. Liraglutide and semaglutide differ in their dosing frequencies (daily for liraglutide; weekly for semaglutide) and exhibit variations in clinical efficacy and safety profiles[6]. While these medications are linked to enhanced long-term effects, it is essential to acknowledge the presence of potential adverse events[7] such as gastrointestinal (GI) adverse events including nausea, diarrhea, and abdominal pain[8,9]. Additionally, instances of pancreatitis and biliary disease have been reported[10]. Therefore, ensuring the appropriate administration of these drugs is crucial for the well-being of patients[11].

Endocrinology medical staff, as key stakeholders in diabetes and metabolic care, play a pivotal role in prescribing and managing these medications, underscoring the importance of acquiring sufficient knowledge about drugs like liraglutide and semaglutide and imparting it to patients[12]. Existing research indicates that the patient-physician interpersonal processes during diabetes treatment intensification may correlate with reduced distress, effective medication adherence, and improved HbA1c[4]. However, the extent of endocrinology medical staff's knowledge regarding the use of liraglutide and semaglutide remains unclear.

Knowledge, attitude, and practice (KAP) is a methodological approach that investigates participants' status of knowledge (K), attitude (A), and practice (P) toward a particular subject through questionnaire-based inquiries[13,14]. It explores potential issues within the status to provide a basis for further optimizing health education and disease management strategies for the population[15]. For example, KAP was previously employed to investigate aspects like screening pre-ulcerative lesions among endocrinology medical staff[16].

Given the complexity of endocrinology practice and the evolving landscape of diabetes management, it becomes imperative to assess the current state of knowledge among endocrinology medical staff regarding the distinct features and effects of liraglutide and semaglutide. Furthermore, exploring the attitude of these medical

[1]Department of Endocrinology, Jiujiang City Key Laboratory of Cell Therapy, JiuJiang NO. 1 People's Hospital, No. 48, South Taling Road, Jiujiang 332000, Jiangxi, China. [2]Department of Endocrinology, The Second People's Hospital of Guiyang, Guiyang 550081, Guizhou, China. ✉email: 47938498@qq.com

staff toward these medications provides valuable insights into their beliefs, expectations, and concerns, which may can impact their prescribing practice. Therefore, this study seeks to examine the KAP among endocrinology medical staff toward liraglutide and semaglutide.

Methods

Research design and participants

This observational study was performed between September and December 2023 at the First People's Hospital of Jiujiang. The inclusion criteria were: (1) Medical staff currently employed in the endocrine department, including doctors and nurse; (2) Actively involved in professional activities related to the endocrine department, either directly in patient care (e.g., prescribing or administering medications) or indirectly through diagnostic and supportive roles (e.g., laboratory, imaging, pharmacy). Patients refused to participate in this study were not enrolled. This study received approval from the Ethic Committee of the First People's Hospital of Jiujiang (JJSDYRMYY-YXLL-2023-194), and all participants provided written informed consent.

Questionnaire introduction

The questionnaires were administrated to the include participants via WeChat and QR codes on the platform Wenjuanxing. After the initial design, the questionnaire was revised based on suggestions from one endocrinology expert and underwent a pilot test with 30 responses, yielding a good internal coefficient of 0.817.

The final questionnaire was in Chinese (a version translated into English was attached as an **Appendix**), comprises four sections on demographics, knowledge, attitude, and practice dimension. The knowledge section consisted of 16 items, score 1 for correct answers and 0 for wrong or unclear responses, with the score range of 0–16 points. The attitude section comprised 10 questions rate on a five-point Likert scale ranging from strongly disagree (1 point) to strongly agree (5 points), with scores ranging from 10 to 50 points. The practice dimension comprised 7 questions rated on a five-point Likert scale from always (5 points) to never (1 point), resulting in score ranging from 7 to 35 points.

Statistical analysis

Statistical software used for analysis includes SPSS 26.0 (IBM, USA) and AMOS 26.0 (IBM, USA). Normally distribution continuous data were presented using mean ± standard deviation (SD); otherwise, non-normally distributed data were shown using medians (interquartile range, IQR) and analyzed using the Wilcoxon rank-sum test. Categorical data were presented as n (%) and analyzed via the chi-square test or Fisher's exact test. The normality of data is performed with the Kolmogorov-Smirnov test, revealing that all data do not follow a normal distribution. Consequently, group comparisons are conducted using the Mann-Whitney test or Kruskal-Wallis H test. The correlation among knowledge, attitude, and practice scores was tested by the Spearman correlation analysis. Univariate and multivariate logistic regression analyses were conducted to examine the associations of covariates with knowledge, attitudes and practices. Structural Equation Modeling (SEM) was utilized to test the following hypotheses: knowledge affects attitude, knowledge affects practice, and attitude influence practice. The model fit was assessed using CMIN/DF (Chi-square fit statistics/degree of freedom), RMSEA (root mean square error of approximation), IFI (incremental fix index), TLI (Tucker-Lewis index) and CFI (comparative fix index). Statistical significance was defined as two-sided $P < 0.05$.

Results

Basic demographic characteristics

A total of 265 medical staff participated in the study, with an average age of 36.31 ± 8.17 years. Among them, 134 (50.57%) were male, and 139 (52.45%) held bachelor's degrees. The group comprised 195 doctors (73.58%) and 41 nurses (15.47%). Intermediate professional titles were held by 140 individuals (52.83%), while 114 (43.02%) reported 6–10 years of work experience. Regarding institutional affiliation, 154 participants (58.11%) worked in western medicine hospitals, and 161 (60.75%) were employed at tertiary hospitals (Table 1). Detailed demographic comparisons between doctors, nurses, and other staff categories are presented in Table S1.

Knowledge, attitude, and practice dimensions

The mean scores for knowledge, attitude, and practice were 11.77 ± 3.37 (range: 0–16), 39.30 ± 4.61 (range: 10–50), and 27.70 ± 5.52 (range: 7–35), respectively. Higher knowledge scores were significantly associated with male gender, being a doctor, higher education levels, advanced professional titles, longer work experience, extended endocrinology practice, and employment in public tertiary hospitals (all $P < 0.05$). In contrast, attitude and practice scores showed no significant variation across demographic groups (all $P > 0.05$) (Table 1).

In the knowledge dimension, the statement "K1: Liraglutide and semaglutide both belong to the class of glucagon-like peptide-1 receptor agonists (GLP-1RA)" had the highest correct response rate at 92.83%. The attitude dimension revealed that most participants held positive attitude toward liraglutide and semaglutide, predominantly selecting "Agree" across items. However, the proportion selecting "Strongly Agree" remained relatively low. For example, only 23.02% strongly agreed with the statement "A10: I believe that in the future, liraglutide will be replaced by long-acting drugs like semaglutide."

In the practice dimension, the highest adherence was noted for the statement "P2: Before prescribing liraglutide or semaglutide to patients, I will provide detailed explanations regarding dosage, administration methods, and frequency," with 87.92% (234 participants) choosing "always" or "often." Conversely, 14.72% strongly disagreed with the statement, "I will proactively prescribe liraglutide and semaglutide to obese patients" (Table S2).

Variables	*N* (%)	Knowledge scores	*P*	Attitude scores	*P*	Practice scores	*P*
Total score		11.77 ± 3.37		39.30 ± 4.61		27.70 ± 5.52	
Gender			0.015		0.083		0.614
Male	134 (50.57)	12.14 ± 3.34		39.77 ± 4.45		27.63 ± 5.43	
Female	131 (49.43)	11.40 ± 3.37		38.82 ± 4.74		27.77 ± 5.62	
Age	36.31 ± 8.17						
Education			< 0.001		0.467		0.142
College and below	40 (15.09)	9.38 ± 4.10		39.00 ± 4.94		25.88 ± 7.42	
Bachelor's degree	139 (52.45)	11.52 ± 3.46		39.30 ± 5.15		28.14 ± 5.63	
Master's degree and above	86 (32.45)	13.3 ± 1.72		39.44 ± 3.42		27.84 ± 3.98	
Professional title			< 0.001		0.833		0.078
Doctors	195 (73.58)	12.56 ± 2.86		39.38 ± 4.23		28.13 ± 5.09	
Nurses	41 (15.47)	9.20 ± 2.99		39.24 ± 5.54		27.12 ± 6.55	
Others*	29 (10.94)	10.14 ± 4.57		38.86 ± 5.69		25.62 ± 6.33	
Professional title			< 0.001		0.191		0.075
Junior and below	78 (29.43)	9.81 ± 4.20		38.62 ± 5.12		26.62 ± 7.49	
Intermediate	140 (52.83)	12.46 ± 2.66		39.49 ± 4.48		27.78 ± 4.51	
Senior	47 (17.74)	12.98 ± 2.18		39.89 ± 4.03		29.26 ± 3.85	
Years of work			0.033		0.291		0.666
≤ 5	51 (19.25)	10.84 ± 3.52		38.51 ± 5.01		28.00 ± 5.33	
6–10	114 (43.02)	11.96 ± 3.60		39.63 ± 4.37		27.34 ± 5.74	
11–15	54 (20.38)	12.11 ± 2.87		39.59 ± 5.15		27.93 ± 5.57	
≥ 16	46 (17.36)	11.93 ± 3.07		39.02 ± 4.09		27.98 ± 5.22	
Years of endocrinology practice			< 0.001		0.116		0.491
≤ 5	100 (37.74)	10.34 ± 4.28		38.44 ± 5.02		26.87 ± 6.74	
6–10	102 (38.49)	12.54 ± 2.19		40.01 ± 4.37		28.05 ± 4.72	
11–15	33 (12.45)	13.3 ± 2.13		40.00 ± 4.11		28.97 ± 4.25	
≥ 16	30 (11.32)	12.27 ± 2.68		39.00 ± 4.19		27.87 ± 4.42	
Hospital type			0.117		0.299		0.747
Traditional Chinese medicine hospital	37 (13.96)	10.73 ± 4.37		39.51 ± 5.28		27.86 ± 6.06	
Western medicine hospital	154 (58.11)	12.24 ± 2.58		39.61 ± 4.35		27.97 ± 4.92	
Integrated Chinese and western medicine hospital	74 (27.92)	11.32 ± 4.06		38.55 ± 4.77		27.05 ± 6.38	
Hospital grade			< 0.001		0.579		0.986
Tertiary hospital	161 (60.75)	12.92 ± 2.27		39.34 ± 3.80		28.07 ± 4.27	
Others	104 (39.25)	10.00 ± 3.99		39.25 ± 5.66		27.12 ± 7.01	

Table 1. Demographic characteristics. *Others refer to professionals in allied health roles who contribute to patient care in the endocrine department, such as those in laboratory diagnostics, imaging, and pharmacy.

Spearman correlation analysis

Spearman correlation analysis revealed positive correlations between knowledge and practice ($r = 0.178$, $P = 0.004$), and between attitude and practice ($r = 0.532$, $P < 0.001$). Among doctors, attitude was significantly correlated with practice ($r = 0.466$, $P < 0.001$). For nurses, positive correlations were reported between KAP scores ($r = 0.310$–0.621, all $P < 0.05$). In other medical staff categories, knowledge ($r = 0.386$, $P = 0.038$) and attitude ($r = 0.632$, $P < 0.001$) showed significant correlations with practice (Table 2).

Multivariate logistic regression analysis

Multivariate logistic regression analysis revealed that holding a bachelor's degree (odds ratio [OR] = 2.82, 95% confidence interval [CI] = 1.02–7.78, $P = 0.046$) and a master's degree or higher (OR = 4.65, 95% CI = 1.34–16.10, $P = 0.015$) were positively associated with knowledge. However, being a nurse (OR = 0.17, 95% CI = 0.06–0.51, $P = 0.002$) and working in lower-grade hospitals (OR = 0.20, 95% CI = 0.10–0.42, $P < 0.001$) were negatively associated knowledge. Knowledge was also independently associated with attitude (OR = 1.12, 95% CI = 1.01–1.25, $P = 0.035$). Moreover, knowledge (OR = 1.21, 95% CI = 1.07–1.37, $P = 0.002$), attitude (OR = 1.15, 95% CI = 1.06–1.26, $P = 0.001$), and professional title (OR = 0.23, 95% CI = 0.07–0.83, $P = 0.025$) were independently associated with practice (Table 3).

SEM results

The SEM indicated acceptable model fit: CMIN/DF = 2.705, RMSEA = 0.080, IFI = 0.801, TLI = 0.783, and CFI = 0.799 (Table S3). Besides, knowledge was observed to significantly influence attitude ($\beta = 0.976$, $P < 0.001$)

Total	Knowledge	Attitude	Practice
Knowledge	1		
Attitude	0.113 ($P=0.067$)	1	
Practice	0.178 ($P=0.004$)	0.532 ($P<0.001$)	1
Doctors			
Knowledge	1		
Attitude	0.038 ($P=0.602$)	1	
Practice	0.067 ($P=0.351$)	0.466 ($P<0.001$)	1
Nurses			
Knowledge	1		
Attitude	0.459 ($P=0.003$)	1	
Practice	0.310 ($P=0.049$)	0.621 ($P<0.001$)	1
Others			
Knowledge	1		
Attitude	0.246 ($P=0.199$)	1	
Practice	0.386 ($P=0.038$)	0.632 ($P<0.001$)	1

Table 2. Spearman correlation analysis. *Others mainly include technical staff, such as medical staffs in laboratory, imaging, pharmacy and so on.

and practice ($\beta = 1.289$, $P < 0.001$). Attitude also had a significant effect on practice ($\beta = 0.627$, $P < 0.001$) (Table 4 and Fig. 1).

Discussion

This study found that the endocrinology medical staff demonstrated suboptimal knowledge, attitude, and practice toward liraglutide and semaglutide, and knowledge and attitude had direct effect on practice, especially in nurses. These results underscore a pressing need for knowledge enhancement initiatives and heightened awareness among endocrinology medical staff.

Compared with traditional agents like sulfonylureas and biguanides, GLP-1RA offers elevated efficacy in weight loss and reduced risk of hypoglycemia, which are particularly advantageous for patients with comorbidities such as obesity and cardiovascular disease[17,18]. Previous studies have highlighted the distinct pharmacokinetic profiles of GLP-1RA, including semaglutide's once-weekly dosing and liraglutide's potential for weight loss[5]. However, the relatively recent introduction of these agents and the higher costs may limit familiarity among medical staff when compared to the long-established use of first-line therapies, such as metformin or sulfonylureas[19]. Gaps regarding their administration and clinical applications were identified among endocrinology medical staff in our study, underscoring the need for evidence-based interventions.

The primary responsibility for managing metabolic disease including type 2 diabetes and obesity lies within primary care, where clinicians, including medical professionals, nursing staff, and pharmacists, play a crucial role[20]. However, knowledge gap was reported regarding the distinct features and effects of liraglutide and semaglutide. Contrastingly, a survey involving 107 medical staff revealed an overall correct response rate of 73.5% for the GLP-1RA knowledge domain, 78.5% for attitude, and 80.3% for practice[21]. One primary reason may be insufficient access to up-to-date training resources and continuing medical education on newer drugs in Jiujiang region. Additionally, the rapid pace of pharmaceutical advancements may result in gaps between the introduction of novel therapies and the dissemination of knowledge to medical staff. Since annual number of prescribed GLP-1RA medications has been on the rise in China[22], inadequate understanding of medication use may result in suboptimal treatment decisions and adherence. Addressing these gaps through targeted educational initiatives and structured training programs is critical to ensuring effective and safe use of GLP-1RA.

Higher education was independently correlated with elevated knowledge, which was echoed by a cross-sectional study with general practitioners concerning knowledge in type 2 diabetes prevention and treatment[23]. This finding highlights the necessity of educational initiatives for endocrinology medical staff, such as treatment efficacy, administration route and adverse effects of GLP-1RA. Doctors and those with higher professional titles are typically more exposed to advanced training opportunities and required to stay updated on the latest clinical advancements, including pharmacological developments like GLP-1RA[24]. Besides, public tertiary hospitals often provide greater exposure to diverse and complex cases, fostering continuous learning and application of advanced therapies such as GLP-1RA[25]. Longer work experience and endocrinology practice likely provide more opportunities to encounter and manage patients requiring advanced pharmacological interventions, thereby reinforcing knowledge through clinical practice. Interestingly, the association between male gender and better knowledge warranted further investigation. While this trend has been observed in other healthcare-related studies[26,27], it raised questions about potential biases in educational or professional opportunities. Addressing the gender disparity may involve creating more inclusive training programs tailored to the needs of all genders.

The question about the administration of GLP-1RA revealed a notable misconception among endocrinology medical staff, with 55.85% erroneously believing that both liraglutide and semaglutide can only be administered via injection. While liraglutide is only available as a subcutaneous injection, semaglutide has both injectable and oral formulations, with the oral form that enhances treatment flexibility and patient adherence[28,29].

Knowledge	Univariate		Multivariate	
	OR (95% CI)	*P*	OR (95% CI)	*P*
Gender				
Male	Ref.			
Female	0.72 (0.44–1.19)	0.199		
Age	1.07 (1.03–1.11)	< 0.001	1.04 (0.96–1.12)	0.322
Education				
College and below	Ref.		Ref.	
Bachelor's degree	4.32 (1.96–9.52)	< 0.001	2.82 (1.02–7.78)	0.046
Master's degree and above	18.50 (7.22–47.38)	< 0.001	4.65 (1.34–16.10)	0.015
Professional title				
Doctors	Ref.		Ref.	
Nurses	0.11 (0.052–0.25)	< 0.001	0.17 (0.06–0.51)	0.002
Others*	0.25 (0.11–0.56)	0.001	0.99 (0.30–3.22)	0.981
Professional title				
Junior and below	Ref.		Ref.	
Intermediate	4.63 (2.56–8.36)	< 0.001	1.55 (0.62–3.86)	0.345
Senior	6.61 (2.86–15.27)	< 0.001	0.940 (0.21–4.20)	0.935
Years of work				
≤ 5	Ref.		Ref.	
6–10	2.74 (1.39–5.40)	0.004	0.77 (0.26–2.29)	0.635
11–15	2.87 (1.29–6.37)	0.010	0.88 (0.21–3.66)	0.861
≥ 16	2.47 (1.09–5.62)	0.031	0.65 (0.096–4.34)	0.652
Years of endocrinology practice				
≤ 5	Ref.		Ref.	
6–10	3.20 (1.79–5.75)	< 0.001	1.62 (0.62–4.22)	0.324
11–15	7.13 (2.54–19.97)	< 0.001	3.02 (0.62–14.73)	0.171
≥ 16	2.97 (1.24–7.12)	0.015	1.25 (0.23–6.78)	0.794
Hospital type				
Traditional Chinese medicine hospital	Ref.		Ref.	
Western medicine hospital	2.640 (1.27–5.49)	0.01	1.08 (0.36–3.2)	0.892
Integrated Chinese and western medicine hospital	1.11 (0.51–2.45)	0.788	1.20 (0.38–3.78)	0.762
Hospital grade				
Tertiary hospital	Ref.		Ref.	
Others	0.13 (0.072–0.22)	< 0.001	0.20 (0.10–0.42)	< 0.001
Attitude	**Univariate**		**Multivariate**	
	OR (95% CI)	***P***	**OR (95% CI)**	***P***
Knowledge	1.20 (1.09–1.30)	< 0.001	1.12 (1.01–1.25)	0.035
Gender				
Male	Ref.			
Female	0.52 (0.24–1.10)	0.085		
Age	1.03 (0.98–1.08)	0.282		
Education				
College and below	Ref.		Ref.	
Bachelor's degree	1.19 (0.47–3.05)	0.714	0.62 (0.22–1.72)	0.357
Master's degree and above	3.44 (1.02–11.60)	0.047	0.96 (0.23–4.11)	0.96
Professional title				
Doctors	Ref.			
Nurses	0.56 (0.22–1.42)	0.218		
Others*	0.44 (0.16–1.20)	0.109		
Professional title				
Junior and below	Ref.			
Intermediate	1.98 (0.91–4.32)	0.084		
Senior	3.49 (0.95–12.79)	0.059		
Years of work				
≤ 5	Ref.			
6–10	2.54 (0.98–6.55)	0.054		

Continued

	Univariate		Multivariate	
Attitude	**OR (95% CI)**	***P***	**OR (95% CI)**	***P***
11–15	1.64 (0.57–4.69)	0.358		
≥ 16	1.63 (0.54–4.89)	0.387		
Years of endocrinology practice				
≤ 5	Ref.		Ref.	
6–10	3.83 (1.55–9.43)	0.004	2.68 (1.00-7.22)	0.051
11–15	9.03 (1.17–69.82)	0.035	6.06 (0.75–49.28)	0.092
≥ 16	2.54 (0.70–9.16)	0.155	1.936 (0.50–7.49)	0.338
Hospital type				
Traditional Chinese medicine hospital	Ref.			
Western medicine hospital	1.94 (0.69–5.44)	0.21		
Integrated Chinese and western medicine hospital	0.91 (0.32–2.6)	0.859		
Hospital grade				
Tertiary hospital	Ref.			
Others	0.37 (0.18–0.78)	0.009	0.791 (0.314–1.993)	0.619
	Univariate		**Multivariate**	
Practice	**OR (95% CI)**	***P***	**OR (95% CI)**	***P***
Knowledge	1.30 (1.18–1.44)	< 0.001	1.21 (1.07–1.37)	0.002
Attitude	1.21 (1.11–1.31)	< 0.001	1.15 (1.06–1.26)	0.001
Gender				
Male	Ref.			
Female	0.83 (0.44–1.57)	0.570		
Age	1.04 (1.00-1.09)	0.059		
Education				
College and below	Ref.		Ref.	
Bachelor's degree	1.78 (0.80–3.94)	0.157	0.66 (0.22–1.94)	0.449
Master's degree and above	4.18 (1.55–11.28)	0.005	0.41 (0.09–1.80)	0.237
Professional title				
Doctors	Ref.		Ref.	
Nurses	0.27 (0.12–0.61)	0.001	0.61 (0.19–1.97)	0.405
Others	0.18 (0.08–0.43)	< 0.001	0.23 (0.07–0.83)	0.025
Professional title				
Junior and below	Ref.		Ref.	
Intermediate	2.37 (1.21–4.64)	0.012	0.82 (0.29–2.32)	0.711
Senior	6.13 (1.73–21.77)	0.005	6.04 (0.89–40.80)	0.065
Years of work				
≤ 5	Ref.			
6–10	1.76 (0.77–4.02)	0.182		
11–15	1.54 (0.59–4.04)	0.382		
≥ 16	1.27 (0.48–3.35)	0.636		
Years of endocrinology practice				
≤ 5	Ref.		Ref.	
6–10	4.02 (1.79–9.05)	0.001	2.06 (0.66–6.39)	0.212
11–15	3.89 (1.10-13.77)	0.035	0.50 (0.10–2.49)	0.395
≥ 16	1.28 (0.49–3.31)	0.614	0.22 (0.05–0.99)	0.049
Hospital type				
Traditional Chinese medicine hospital	Ref.		Ref.	
Continued				

Practice	Univariate		Multivariate	
	OR (95% CI)	*P*	OR (95% CI)	*P*
Western medicine hospital	3.19 (1.31–7.79)	0.011	1.23 (0.35–4.32)	0.744
Integrated Chinese and western medicine hospital	0.94 (0.39–2.26)	0.881	0.61 (0.16–2.24)	0.452
Hospital grade				
Tertiary hospital	Ref.		Ref.	
Others	0.33 (0.17–0.62)	0.001	0.71 (0.29–1.77)	0.463

Table 3. Univariate and multivariate logistic regression analysis in knowledge, attitude, and practice dimensions.

			β	S.E.	C.R.	*P*
Attitude	<---	Knowledge	0.976	0.226	4.317	< 0.001
Practice	<---	Attitude	0.627	0.092	6.782	< 0.001
Practice	<---	Knowledge	1.289	0.267	4.827	< 0.001

Table 4. Structure equation model (SEM).

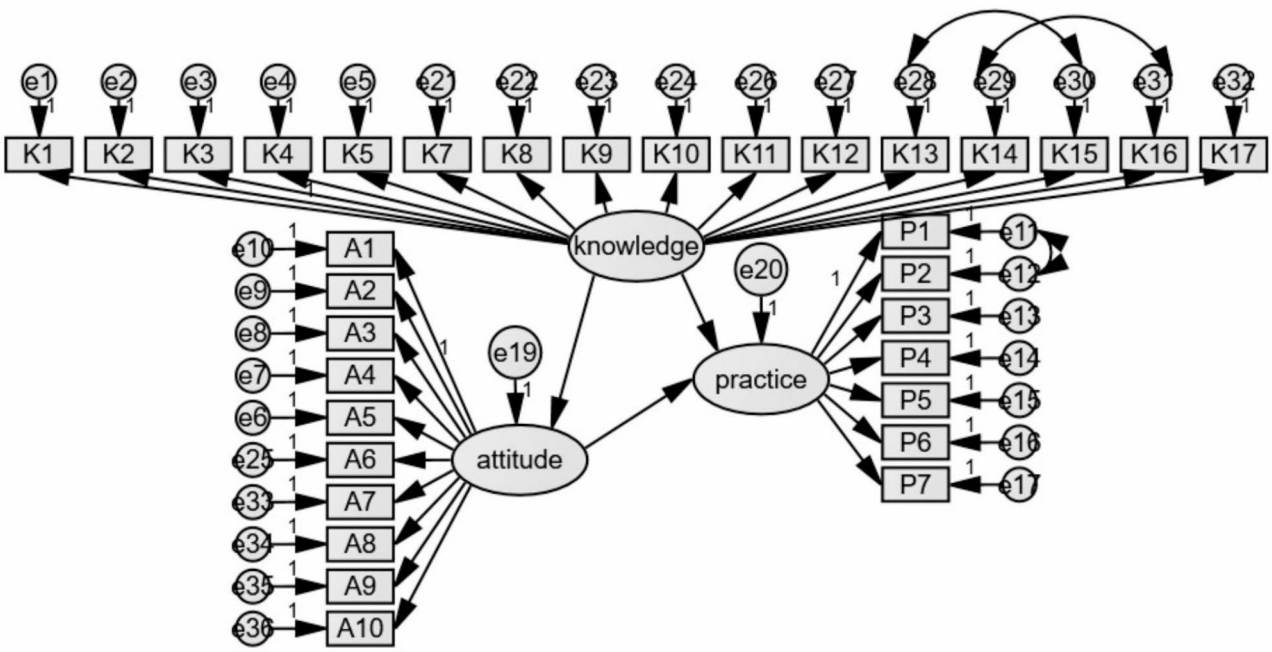

Fig. 1. Structure equation model (SEM).

The knowledge gap may stem from insufficient training of GLP-1RA prescription, given the role of ongoing education in updating medical staff's usage of evolving pharmacological landscapes[30]. The misconceptions about administration routes can limit personalized treatment plans, thereby affecting patient outcomes. Educational initiatives focusing on the characteristics of different GLP-1RA formulations, including their administration routes and clinical implications, can improve prescribing practices.

A noteworthy discovery emerged from our investigation, revealing that 14.72% exhibited reluctance to proactively prescribe liraglutide and semaglutide for obese patients. This finding suggests a significant portion of endocrinology medical staff may harbor concerns regarding the use of GLP-1RA in obesity management. Possible factors contributing to this reluctance include concerns about potential side effects and a lack of confidence in patient adherence to the prescribed treatment[8,31]. These findings aligned with observations in the practice dimension, where 87.92% often provide detailed explanations regarding dosage, administration methods, and frequency to patients before prescribing liraglutide or semaglutide. Addressing these concerns may prove instrumental in fostering a more informed and confident approach to prescribing liraglutide and semaglutide in obesity management within the endocrine department[32]. Our study also revealed the positive associations between KAP scores. A lack of confidence in prescribing GLP-1RA, likely stemming from insufficient

knowledge of administration protocols and side effects, may discourage their use and cause an over-reliance on alternative treatments. Furthermore, practical concerns, such as cost-related barriers and difficulties in continuous education, may amplify this hesitance[33]. Addressing these concerns through structured training and institutional support is essential to improve the integration of liraglutide and semaglutide into clinical practice.

This study had several limitations. First, the single-center design and limited sample size may restrict the generalizability of the findings to other endocrinology departments or healthcare settings. Second, the reliance on self-reported data may introduce the response bias due to social desirability[34]. Third, the study focused only on medical staff without assessing patient outcomes, which masked the evaluation of the real-world impact of GLP-1RA. Fourth, the use of an online survey may have introduced bias, as medical staff more familiar with digital platforms might have been overrepresented, potentially affecting the diversity of the sample and the findings. Finally, the cross-sectional study limited drawing causal relationships or tracking longitudinal changes. Future research should address these limitations by incorporating multi-center designs, larger and more diverse population, and patient outcome measures to enhance the applicability of the findings.

In conclusion, this study showed deficiencies in knowledge, attitude, and practice toward liraglutide and semaglutide among endocrinology medical staff. The findings underscore the imperative for tailored educational interventions to address knowledge gaps and improve the proficiency of endocrinology medical staff.

Data availability

All data generated or analyzed during this study are included in this article and supplementary information files.

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Author contributions
Jie Yu and Bingling Liu carried out the studies, participated in collecting data, and drafted the manuscript. Xueyi Wu and Xiao Zou performed the statistical analysis and participated in its design.Jianjian Sheng participated in acquisition, analysis, or interpretation of data and draft the manuscript. All authors read and approved the final manuscript.

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Declarations

Ethics approval and consent to participate
This work has been carried out in accordance with the Declaration of Helsinki (2000) of the World Medical Association. This study was approved by the Ethic Committee of the First People's Hospital of Jiujiang (JJSDYRMYY-YXLL-2023-194), and all participants provided written informed consent.

Competing interests
The authors declare no competing interests.

Additional information
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Correspondence and requests for materials should be addressed to J.Y.